ABSTRACT

Title of Dissertation: THE RELATIONSHIP BETWEEN SCHOOL CLIMATE DIMENSIONS AND READING AND MATHEMATICS ACHIEVEMENT SCORES IN ELEMENTARY SCHOOLS

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School climate is a malleable construct that schools or districts can utilize to target the individualized needs of specific groups of students. The purpose of this study was to examine the relationship between perceptions of different school climate dimensions and reading and mathematics achievement scores for elementary school students of different gender, grade level, and prior achievement. There is general agreement that school climate is a composite variable made up of many dimensions (Brookover & Erickson, 1975). For school climate to become an important avenue for school reform and improved educational practice, it must be defined in terms of specific

contributing dimensions, then studied in terms of the relationship between each climate dimension and achievement scores for different groups of students.

To examine the research questions, a two-stage quantitative analysis of data was utilized using school-level data first and student-level data second. Measures utilized included measures of school climate, measures of reading and mathematics achievement, and individual characteristics. The data analysis procedures included bivariate regression and multiple regression. The findings indicated that the most consistent school climate dimensions to have a significant association with student achievement in reading and mathematics were "safety," and "interpersonal relationships," as well as several of their subdimensions. Overall, these dimensions were more frequently predictive of mathematics achievement as opposed to reading achievement, male achievement as opposed to female achievement, and 4^{th} grade achievement as opposed to 5^{th} grade achievement.

Continued study of the relationship between dimensions of school climate and student achievement could help solidify the literature regarding the efficacy of school climate as an adequate measure of school quality as it relates to student outcomes such as reading and mathematics achievement.

THE RELATIONSHIP BETWEEN SCHOOL CLIMATE DIMENSIONS AND READING AND MATHEMATICS ACHIEVEMENT SCORES IN ELEMENTARY SCHOOLS

by

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Chapter I

Introduction

Public schools are charged with educating all students regardless of their backgrounds. Increased federal and state accountability mechanisms have created the impetus for public schools and districts to examine and implement diverse interventions to ensure positive outcomes for all students. This mandate has created a great need to understand how specific education practices impact the academic achievement of different groups of students. By deploying individualized, data-driven best practices that promote enhanced academic achievement for different populations of students, we can ensure that all students receive an education that is responsive to their specific needs.

Statement of Purpose

The national emphasis on student achievement has resulted in much research aimed at identifying educational interventions that promote enhanced student outcomes. School climate is an underexplored and often overlooked variable that has been shown to improve student achievement (Brookover, Schweitzer, Schneider, Beady, Flood, & Wisenbaker, 1978; Chen & Weikart, 2008; Cohen, McCabe, Michelli, & Pickeral, 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil, Prater & Busch, 2009; Pallas, 1988; Ross, McDonald, Alberg, & McSparrin-Gallagher, 2007; Shann, 1999; Sherblom, Marshall, & Sherblom, 2006; Sweetland & Hoy, 2000; West, 1985). School climate is a composite variable made up of many dimensions (Brookover & Erickson, 1975) which can be utilized to bring about improved student achievement for varied groups of students. Because school climate can be purposefully designed, built,

defined, improved, and changed (Deal & Kennedy, 1982; Firestone & Louis, 1999; Freiberg, 1998; Hoy & Miskel, 2008; Saphier & King, 1985; Schein, 2010; Shann, 1999), further study regarding the effect of school climate on student achievement is warranted. The purpose of this study is to examine the relationship between perceptions of different school climate dimensions and reading and mathematics achievement scores for elementary school students of different gender, grade level, and prior achievement.

Historical Context

In 1965 the Elementary and Secondary Education Act (ESEA) was passed under President Lyndon B. Johnson. It funded primary and secondary education initiatives emphasizing fair and equal access to education, high standards, and accountability. The Act was an attempt to combat achievement disparities between children living within different income brackets. Around this time the U.S. Department of Education commissioned a report on education equality in the United States. The landmark "Equal Educational Opportunity Survey", later known as the Coleman Report (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, & York 1966), raised questions about whether school funding and resources had any effect on student achievement as compared to student background and socioeconomic status. One interpretation of the Coleman Report was that "low achievement by poor children derived principally form inherent disabilities characterizing the poor" and that schools made little difference in the education of minority and poor children (Edmonds, 1979, p. 16). This view absolved schools from being responsible for inadequate student outcomes since it implied that student outcomes resulted from factors, such as race and poverty, outside the control of

schools. The controversial Coleman report sparked debate and research about the role of schools in determining student outcomes.

A strong research branch developed to explore alternatives to the interpretation of the Coleman report that school quality made little difference to student outcomes as compared to demographic characteristics. Levin (1970) studied students' sense of efficacy, motivation, and parents' attitudes and found that educational programs focusing on student attitudes could compensate for "disadvantages" in socioeconomic background. Successful efforts to change student attitudes could offset the assumed deleterious effect background conditions (Levin, 1970). Using examples of schools producing strong outcomes for poor, minority, and urban students, researchers such as Brookover and Lezotte (1977), Edmonds (1979), and Fredericksen (1975) began producing findings showing that schools can and do make a difference. As stated by Edmonds (1979, p. 20), "all children are eminently educable and … the behavior of the school is critical in determining the quality of that education." Other researchers went further stating that "every individual has the right to an equal chance to succeed in our country" (Lezotte, Hathaway, Miller, Passalacqua, & Brookover, 1980, p. 16). This view holds schools responsible for ensuring equity in and accessibility to education and formed the basis for the effective schools movement.

During the 1970's, schools in the Unites States continued to lag behind the educational advancement of other nations. A sense of urgency emerged prompting the beginning of the accountability movement. In 1981, then Secretary of Education T. H. Bell, under President Ronald Reagan, observed that the United States' educational system was not only lagging on the international front, but was also failing to meet the domestic

need for a competitive workforce. He created the National Commission on Excellence in Education to examine the quality of education in the United States and to make practical recommendations for educational improvement. This resulted in the publication of "A Nation at Risk: The Imperative for Educational Reform" in 1983 (National Commission of Excellence in Education, NCEE). The report made the claim that the United States was being outperformed by competitors throughout the world in the areas of commerce, industry, science, and technological innovation. While there were clearly many complex causes for this reality, the report focused on education as being the one cause "that undergirds American prosperity, security, and civility" (NCEE, 1983, p.5). The report went on to state that "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people" (NCEE, 1983, p.5).

The report started a drive for education reform and brought about a push for the implementation of varied accountability measures for schools. This push for reform influenced several reauthorizations of the Elementary and Secondary Education Act. The latest iteration authorized in 2015 is known as the Every Student Succeeds Act (ESSA). ESSA makes student achievement for all children a priority and requires school systems to develop a set of indicators to measure school quality:

For elementary and middle schools these indicators include:

1. Proficiency in reading and mathematics
2. English language learner proficiency
3. One other academic measure that is valid, reliable, and statewide

4. At least one nonacademic measure of school quality or success such as measures of safety, student engagement, or school climate

For high schools these indicators include:

1. Proficiency in reading, mathematics, and science
2. English language learner proficiency
3. Graduation rates
4. At least one nonacademic measure of school quality or success such as measures of safety, student engagement, or school climate

For accountability purposes ESSA requires states to disaggregate their data by the following subgroups: race/ethnicity, gender, socioeconomic status, disability, and English Language Learners (ELLs). ESSA includes three new subgroups for data reporting, but not accountability purposes: homeless status, students with a parent in the military, and students in foster care.

As compared with prior versions of the Act, ESSA now includes a broader definition of student success beyond test scores to include a non-academic indicator. In doing so, ESSA has given states some flexibility to broaden the benchmarks for which schools are held accountable. The requirement to include at least one non-academic indicator of school quality provides new opportunities for measuring broader aspects of school quality beyond test scores. States can include more than one nonacademic indicator if they choose to do so. The federal government is prohibited from prescribing the indicator that states select, but ESSA does require that whatever indicators are selected must be valid, reliable, comparable, and statewide (in other words used by all

schools in the state). The indicator must also be able to distinguish between schools that differ with respect to performance on the identified indicator. ESSA provides specific examples of possible indicators such as school climate and safety, student or educator engagement, access to advanced coursework, and postsecondary readiness. However, specific indicators are not mandated nor must selections be made from the aforementioned list. Additional indicators that have been considered by states include absenteeism, discipline referrals, dropout rates, and access to extracurricular and other enrichment opportunities.

The process of selecting an indicator that would be the best measure of school quality for the state is not an easy task. In addition, identification of this indicator sends a message to the whole school community about what is valued and where to focus resources. Selection of the non-academic indicator creates an opportunity for states to identify and prioritize a holistic approach to helping students and educators thrive. The National Education Policy Center (2016), has made some recommendations about how to select non-academic indicators of school quality to help states adhere to the requirements outlined by ESSA. They recommend identifying indicators that signal the importance of equity, including student and teacher opportunities to learn and school climate.

Student and teacher opportunities to learn indicators can include measures of how schools support teacher, parent, community, and student engagement, evidence of preparation for future academic and career success, opportunities to contribute to civic life, and processes for scaling up effective programs. Collecting data on these indicators can elucidate whether all students are provided with equitable and adequate opportunities to access the curriculum in order to meet state standards.

School climate indicators can include measures of perceptions of safety, belonging, and psychosocial impacts of the school community. This can include information about who is more likely to experience bullying and harassment, who feels safe at school, and which groups of students do or do not have caring relationships with adults at school. Collecting data on these indicators can show how students perceive their school experience and whether the school context is such that it allows them to thrive and meet their fullest potential. Selecting and measuring non-academic indicators that signals the importance of equity, such as measures of student and teacher opportunities to learn or measures of school climate can provide information about how students and teachers experience their school community.

Selection of the non-academic indicator as required by ESSA has serious implications for resource allocation in particular. Lessons can be learned from Croninger, Rice, and Checovich (2016) who examined the efficacy of using Free or Reduced Price Meals (FRPM) eligibility as a way to distinguish between economically disadvantaged students and economically advantaged students in state aid formulas, and in particular to identify the need for compensatory funding. They explored alternative indicators that could be used to determine compensatory aid. They found that the choice of which indicator to use matters significantly for a number of reasons. In this case, the selection of indicators created major changes in how compensatory aid for school districts was allocated raising the issue of equity. In addition, "not all indicators were equally accessible, likely to have the same face validity with the public or were well matched with other education policies, such as the requirement to disaggregate achievement data by income status" (p. 32). As shown in this study, serious

consideration is needed when selecting indicators of economic need. Similarly, serious consideration must be given by states to implications associated with selection of the non-academic indicator of school quality as required by ESSA.

ESSA reasserts the nation's longstanding commitment to equal educational opportunity for all students. The updated law focuses on the clear goal of fully preparing all students for success in college and careers. Through broadened accountability requirements such as academic measures of proficiency on annual assessments, graduation rates, English language proficiency progress, and measures of school quality or student success, ESSA seeks to ensure success for all students.

Statement of the Problem

There is much evidence suggesting that students' backgrounds are a major determinant of their academic success (Voight, Austin & Hanson, 2013). Public schools, however, are charged with educating all students regardless of demographic indicators. Addressing the impact of individual student factors such as race, socioeconomic status, English language proficiency, and special needs often requires collaboration with other social entities beyond the reach of schools. There is however much evidence suggesting that successful schools can mediate the impact of individual factors through targeted interventions and programming (Brookover & Lezotte, 1977; Edmonds, 1979; Fredericksen, 1975). The current study focuses on the impact of interventions that are consistent with ESSA's accountability requirements and that can be implemented internally and independently.

As described above, ESSA requires states to disaggregate their student data by different student subgroups. Schools with significantly underperforming subgroups (as defined by the state) must develop remediation plans that include evidence-based strategies. This requirement has created the impetus for researchers to examine which types of interventions work for which subgroups of students. By designing data-driven interventions that promote best practices for different subgroups of students, we can ensure that all students receive an education that is responsive to their specific needs. Furthermore, ESSA requires states to include at least one nonacademic measure of school quality or success. School climate is listed by ESSA as one possible indicator to meet this accountability requirement.

School climate is a malleable construct that schools or districts can utilize to target the individualized needs of specific groups of students. While there is general agreement that school climate is a composite variable made up of many dimensions (Brookover & Erickson, 1975), there is little agreement as to what specific dimensions matter most for improving student outcomes.

The National School Climate Center (NSCC) has synthesized much of the research on school climate and has developed a model that describes school climate as being made up of four major dimensions: safety, teaching and learning, interpersonal relationships, and institutional environment, each of which are made up of additional subdimensions. The National School Climate Center based their Comprehensive School Climate Inventory (CSCI) on these four dimensions. According to the NSCC (NSCC, n.d.), school climate is defined as the quality and character of school life as experienced

by students, personnel, and families. In this view, school climate sets the tone in a building and provides the context within which teaching and learning takes place.

Despite the fact that there is no established uniform definition or measure of school climate in the field, the current study relies on the NSCC's definition and their measure, the Comprehensive School Climate Inventory (CSSI). NSCC's definition of school climate to include the four dimensions listed above, is a comprehensive reflection of current research in school climate. NSCC's model is very similar to the description of school climate by Wang and Degol (2016) derived from their recent review of 327 articles on school climate. Their model includes academic, community, safety, and institutional environment. In addition, the literature review on school climate and student achievement shows a significant number of studies that can be grouped according to NSCC's four major school climate dimensions making it a useful and representative definition.

Traditionally school climate has either been studied as a single global construct, which has included loosely grouped concepts such as school environment, learning climate, sense of community, leadership, academic climate, and social climate (Hoy & Hannum, 1997), or it has been studied as a narrow construct that included only one or two dimensions. This lack of clarity regarding the exact nature of school climate makes it a useful integrating concept, but it also reduces its ability to serve as a useful tool for practitioners. For school climate to become an important avenue for school reform and improved educational practice, it must be defined in terms of specific contributing dimensions, then studied in terms of the relationship between each climate dimension and achievement scores for different groups of students. As stated by Hoy and Hannum

(1997), "school climate needs to be specified if we are to understand how it is related to student achievement" (p. 295).

There is little research comparing the impact of different school climate dimensions on student achievement scores. As stated by Christie and Merton (1958, p. 127), "…if climate…is to be examined and methodically related to the ways in which it affects the learning of students, then methods must be developed to describe and to compare them." Furthermore, there is little research comparing the impact of different climate dimensions on the reading and mathematics achievement scores of students of different gender and grade levels. Many educational innovations have shown differing student outcomes based on gender and grade level implying that improving student achievement scores cannot be tackled using a "one size fits all" approach. Differentiated efforts must be implemented in order to meet the varied needs of all students. For this reason, it is essential to understand which dimensions of school climate impact different groups of students. This will allow for a more tailored approach to school reform and more targeted efforts at improving student achievement scores.

This study examines the relationship between perceptions of different school climate dimensions and reading and mathematics achievement scores for different sub-populations of elementary school students – specifically, male and female students, 4th and 5th graders, and low and high achieving students. Using student and school-level climate and achievement data, an exploratory quantitative analysis provides information about which dimensions of school climate impact the achievement outcomes of which groups of students. Such information has the potential to inform and refine school reform

efforts that attempt to identify best practices for school design, programming, and management. This study provides some information about the relationships between school climate dimensions and student achievement scores for different groups of students. These results could position school climate as an important lever for policy makers to include in federally mandated accountability measures moving forward. School climate improvement efforts could then become an integral part of our educational approach nation-wide, to be mandated at the federal and state levels, implemented at the school level and integrated into classroom practice in the service of improved student outcomes.

Significance of the Study

In 1993, Miller stated that school climate had rarely been studied in relation to its effect on student achievement but more commonly was used to study leadership and management practices. In recent years, however, more and more research has been dedicated to determining the impact of school climate on student learning (Sergiovanni, 2001). To date much of the research in this field has treated school climate as a general construct, and this body of work has shown clear evidence that school climate impacts student achievement (Brookover et al., 1978; Chen & Weikart, 2008; Cohen et al., 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil et al., 2009; Pallas, 1988; Ross et al., 2007; Shann, 1999; Sherblom et al., 2006; Sweetland & Hoy, 2000; West, 1985). While interesting, these findings have little value to practitioners and policy makers if the construct of climate is not broken down and described in terms of the impact of contributing climate dimensions on student outcomes. This study is significant

in that it examines the relationship between identified school climate dimensions and student achievement in reading and mathematics across gender, grade level, and prior achievement. This analysis can help practitioners and policy-makers prioritize school improvement efforts based on knowledge about what school climate dimensions work to nurture the achievement of different groups of students.

An examination of the relationship between the contributing dimensions of school climate and student achievement adds to the body of knowledge about factors impacting student outcomes and could potentially inform school reform efforts. In determining which school climate dimensions impact which groups of students, policy makers and school administrators will have a clearer roadmap as to where and how to focus individualized school improvement efforts in the service of improved outcomes for all students.

Summary

Accountability in schools has been a driving force in education reform over the last 50 years. Public schools are charged with educating all students regardless of the student's background or demographic indicators. ESSA requires states to disaggregate their student data by different student subgroups. Schools with significantly underperforming subgroups must develop remediation plans that include evidence-based strategies. This requirement has created the impetus for researchers to examine which types of interventions work for which subgroups of students. By designing data-driving interventions that promote best practices for different subgroups of students, students will receive an education that is responsive to their specific needs.

ESSA requires states to include at least one nonacademic indicator of school quality or success. ESSA provides specific examples of possible indicators to meet this accountability requirement, but these are not mandated nor must individual states choose their indicator from a specific list. School climate is listed by ESSA as one possible indicator to meet the nonacademic accountability requirement, which makes it a relevant and worthy construct to study.

There is general agreement that school climate is a composite variable made up of many dimensions (Brookover & Erickson, 1975) and that school climate as a general construct impacts student achievement (Brookover et al., 1978; Chen & Weikart, 2008; Cohen et al., 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil et al., 2009; Pallas, 1988; Ross et al., 2007; Shann, 1999; Sherblom et al., 2006; Sweetland & Hoy, 2000; West, 1985). There is little research, however, comparing the impact of different climate dimensions on reading and mathematics achievement scores across various subgroups of students, such as gender, grade, and prior achievement. For school climate to become an important avenue for school reform, it must be studied in terms of the relationship between each contributing climate dimension and achievement scores for different groups of students.

The purpose of this study is to examine the relationship between perceptions of different school climate dimensions and reading and mathematics achievement scores for different sub-populations of elementary school students. Such information has the potential to inform and refine school reform efforts that attempt to identify best practices for school design, programming and management.

Chapter II

Literature Review

The purpose of this study is to examine the relationship between perceptions of different school climate dimensions and reading and mathematics achievement scores for elementary school students of different gender, grade levels, and prior achievement. The literature review presented here provides an overview of the theoretical context within which this research was conducted. By reviewing the available literature on relevant topics such as school structure, qualities of effective schools, and the value of school climate as a vehicle for improved student achievement, major themes are identified as well as gaps in the literature that inform the development of the conceptual framework and the research questions for the current study.

Schools as Open Systems

Efforts at school improvement require a clear understanding of how schools are organized in order to determine logical avenues of influence. Organizational theory has developed a variety of lenses through which to view and understand organizations, one of which is the systems perspective (Hoy & Miskel, 2008). Three types of systems perspectives have emerged. The rational-systems perspective describes organizations as formally structured entities designed to achieve predetermined goals with maximum efficiency. The natural-systems perspective describes organizations as a conglomeration of informal social groups based on relationships and informal norms. These first two systems perspectives have been described as closed systems that are self-contained and free of outside influence. Contemporary organizational theorists, however, understand

that organizations cannot exist in isolation from their environments. Organizations are affected by politics, community initiatives and other environmental forces which cannot be ignored. It is now commonly agreed by organizational theorists that most organizations are in fact open systems which interact with external forces and use them to purposefully achieve their goals. Furthermore, organizations such as schools can be viewed as social systems that are dependent on and influenced by their environment (Hoy & Miskel, 2008).

Many theorists have further defined the open-systems view of schools by attempting to define the different inputs and outputs that make up the school as a system. Sells (1968) suggests that schools are social systems that are made up of eight major components. Two of the components can be described as inputs: personnel and technology. The other six are components that inform the transformational process – that is the process by which inputs are transformed into outputs – and include objectives and goals, philosophy and value systems, organization, physical environment, social-cultural environment, and temporal characteristics. He further makes the point that many of these components are similar to those dimensions that make up a positive school climate.

Hoy and Miskel (2008) have described the transformation process in schools as being comprised of and influenced by four subsystems: a) the structural subsystem, which outlines formal bureaucratic expectations; b) the individual subsystem, which delineates the needs, goals, beliefs, and responsibilities of each employee; c) the political subsystem, which is the system of informal power relations and d) the cultural subsystem, which determines the shared work orientations of all employees and gives the

organization its unique identity. The four subsystems interact in such a way as to transform inputs into desired outcomes thus providing a comprehensive approach to improvement. As described by Hoy and Miskel (2008), "as a social system, the school is characterized by an interdependence of parts, a clearly defined population, differentiation from its environment, a complex network of social relationships, and its own unique culture" (p. 22).

The open system view of schools puts forth the notion that public schools are responsible for the outcomes of all students regardless of student backgrounds. From the open-systems perspective, a series of formal and informal inputs from the environment are transformed by an organizational process which occurs within the school, and that process informs student outcomes. When organizational processes are successful, all students achieve and attain desirable educational goals; when organizational processes are inadequate, only some students achieve and attain the educational goals desired by policymakers, educators, and parents.

The open-systems perspective of schools has led researchers to more fully examine the nature of the transformational process which occurs in schools in order to identify which characteristics of schools significantly and consistently effect student outcomes. A body of research developed into the effective schools movement which aimed to show that all children can be educated regardless of background and that there exist specific best practices within K-12 schools that make educating all students possible.

The view that schools are open systems informs this research in that inputs from the environment (personnel, students, families, and resources) are transformed by an organizational process such as a specific school climate improvement intervention with the goal of producing strong outcomes for all students. The conceptual framework and research questions for this study are informed by the open-systems view of schools, and as explained next, the effective schools literature as well.

The Effective Schools Movement

> The challenge is clear. On the one hand, we can either continue to accept low levels of achievement from schools serving poor and minority students and, when asked why this must be so, we can review the appropriate studies. The result is likely to be both a further erosion in the public's confidence in schools and a further erosion in the quality of education available to the students of low income families. *Or*, we can conclude that achievement levels for the children of low income families must be increased. We know it can be done, and we know it is being done in some schools. If we accept the latter position, we must be willing to step back and carefully, thoroughly, and unceasingly examine education policies, practices, beliefs, and behaviors. America cannot afford to have its system of schools fail for so many of its clients (Lezotte et al., 1980, p. 20).

In reaction to some interpretations of the Coleman Report (Coleman et al., 1966), which surmised that individual student characteristics such as social class and race were major determinants of student outcomes, researchers began to question why some schools were producing high achievement results regardless of the fact that they were servicing underprivileged students who traditionally demonstrated lower levels of achievement. Rather than looking at overall performance of all schools servicing underprivileged students and concluding that these types of students were uneducable due to their individual characteristics, researchers began to focus their attention on schools that would be described by Malcolm Gladwell (2008) as "outliers". Gladwell (2008) described

outliers as “something that is situated away from or classified differently from a main or related body” and “a statistical observation that is markedly different in value from the others of the sample” (2008, p.2). In the case of schools, outliers were defined as “schools that served large proportions of poor or minority students that distinguished themselves from the norm because of their markedly higher achievement” (Lezotte & Snyder, 2011, p. 21).

Such outliers could no longer be ignored and researchers such as Brookover and Lezotte (1977), Edmonds (1979), and Fredericksen (1975) began to document the positive impact that these outlier schools were having on student outcomes with the goal of learning about their approaches so that they could be replicated. Research yielded identification of seven effectiveness correlates:

1. High expectations for success
2. Strong instructional leadership
3. Clear and focused mission
4. Opportunity to learn/time on task
5. Frequent monitoring of student progress
6. Safe and orderly environment
7. Positive home-school relations

As described by Lezotte and Snyder (2011),

> The correlates of effective schools represent a set of interdependent components that work together to accomplish the aim of the effective school: learning for all. In this respect, the correlates contribute to the functioning of a school as a system. (p. 36)

According to Lezotte and Snyder (2011), each correlate can be viewed as a subsystem that adds value to the teaching and learning that occurs in the school, contributes to the transformation that occurs within the school, and contributes to the overall effectiveness of the school. Edmonds (1979) noted that to advance school effectiveness, a school must implement all of the correlates at once and attention must be paid to how each one is functioning individually as well as how they are interacting with one another.

The effective schools movement emphasizes that "all children can learn and that the school controls the factors necessary to ensure student mastery of the core curriculum" (Lezotte & Snyder, 2011, p.1). In this view, schools are responsible for effectively teaching all children and the means to do so are within the realm of school control regardless of student demographics. As described by Ruus, Veisson, Leino, Ots, Pallas, Savr, and Veisson (2007), it is the responsibility of the school to create a positive climate:

> …where students are encouraged to perceive learning tasks as challenges and opportunities for self-improvement, develop constructive coping strategies, where they are supported by teachers if necessary, and feel psychologically and physiologically well. One must not forget that school climate is to a great degree under the control of its pedagogical staff. (p. 932)

This implies that school climate can be manipulated and changed to be used as a tool to enhance student achievement.

Effective schools are described as schools that strive for and attain high and equitable levels of learning for all students (across all major subgroups) and ensure the acquisition of essential knowledge, concepts, and skills needed to succeed. The

explanation for their success lies in the nature of the interaction between the school experience and the demographics and academic histories of their students.

The notion that the school experience should be examined in order to determine how it can best influence student outcomes is an important contribution of the effective schools movement. Effective schools research is specifically concerned with how internal school variables affect the performance of specific subgroups of students. Determining what exactly occurs in highly effective schools is the task of researchers who have set forth to identify best practices in K-12 education.

The effective schools movement is used as a backdrop for the current study in that the correlates of effective schools are very similar to the components described by Sells (1968) as contributing to the transformation phase of the open-systems model of organizations. Furthermore, Hoy (1990), describes the correlates of effective schools as constituting a school climate that promotes academic achievement. For these reasons the effective schools movement is an important perspective to include in developing the conceptual framework and research questions for the current study.

The effective schools movement grew in parallel to research into effective organizational management strategies aimed at determining how to increase productivity in American companies. Organizational culture and climate emerged as being keys to increased organizational effectiveness in large companies. They are examined here in relation to how they can inform research that identifies school practices aimed at improving student outcomes.

Organizational Culture and Organizational Climate

The open-systems perspective of organizations emphasizes the importance of processes that occur within the business workplace environment as being paramount to improved performance and enhanced outputs. Organizational culture and organizational climate have emerged as related concepts used to describe business workplace processes that hinder or encourage optimal member performance.

One way to identify the precursors to optimal member performance is to use Abraham Maslow's theory of human motivation (1943). By determining what individual needs must be met in order to achieve the highest level of motivation, managers can structure their organizations and develop their management styles to meet these needs with the goal of improving performance. Maslow's theory has three assumptions:

1. Human needs are never completely satisfied.
2. Human behavior is purposeful and is motivated by the need for satisfaction. Unfulfilled needs lead individuals to focus exclusively on those needs.
3. Needs can be classified according to a hierarchical structure of importance from lowest to highest needs: physiological, safety, belongingness/love, self-esteem, and self-actualization.

Maslow's theory emphasizes the importance of the hierarchy in that the higher-level needs become activated as the lower-level needs become satisfied. Individual behavior is therefore motivated by an attempt to satisfy the need that is most important at that time.

The higher-level needs continually motivate individuals and bring about improved performance, with self-actualization being the ultimate motivator.

From this point of view, schools should strive for the highest level of need satisfaction because self-actualizing students, teachers and administrators are the best performers (Hoy & Miskel, 2008). In order for individuals to feel self-actualized, all lower order needs such as esteem, belonging, safety, and physiological needs must be met first. How organizations meet these diverse needs is the result of what Selznick (1957) termed the unique organizational character of an institution or it's climate. This notion has provided the impetus for research into the nature of organizational characteristics as they relate to performance. The related concepts of organizational culture and organizational climate have emerged as ways to describe the internal characteristics of organizations.

Organizational Culture

In the 1980's researchers such as Deal and Kennedy (1982), Ouchi (1981), and Peters and Waterman, (1982) began documenting the characteristics of successful business corporations. These analyses concluded that effective organizations have "strong and effective corporate cultures and that the basic function of executive leadership is to shape the culture of the organization" (Hoy & Miskel, 2008, p.177).

The word "culture" is defined by the Merriam Webster Dictionary as being *"*the integrated pattern of human behavior that includes thought, speech, action, and artifacts and depends upon the human capacity for learning and transmitting knowledge to

succeeding generations" (Merriam-Webster collegiate dictionary, 2016). In the 20th century, "culture" has emerged as a central concept in the field of anthropology, encompassing all human phenomena that are not the result of human genetics. Specifically, in the field of anthropology, the term "culture" is defined as being something that is not innate but learned, shared by a group of people, passed down through the generations, and used as a way to define social boundaries between different groups (Tylor, 1958). Furthermore, "culture" constitutes the interrelation between many facets such as language, beliefs, morality, norms, customs, institutions, and physical objects (Hoy & Miskel, 2008). Bolman and Deal (2008) describe culture as being both a product, as it embodies information accumulated over time, and a process, since it is renewed and re-created as it is passed along to newcomers.

Due to its enduring nature, organizational culture came to the forefront of corporate management thinking due to its potential to provide information about the driving forces behind successful companies, and it's potential to inform and improve productivity in American companies. Using the results of their survey of over 80 companies, Deal and Kennedy (1982) made the claim that companies with consistently high performance all had strong business cultures and that this culture was developed purposefully by leaders and managers.

Organizational culture has been defined in a variety of ways. Ouchi (1981) defines organizational culture as being comprised of "symbols, ceremonies, and myths that communicate the underlying values and beliefs of that organization to its employees" (p. 41). Mintzberg (1989) defines organizational culture as the "traditions and beliefs of

an organization that distinguish it from other organizations and infuse a certain life into the skeleton of its structure" (p. 98). Schein (2010) defines organizational culture as being:

> …a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. (p. 18)

Denison (1990) lists mission, consistency, involvement, and adaptability as being the four key dimensions of organizational culture. While the range of definitions makes it difficult to pin down exactly what constitutes organizational culture, most definitions assume that organizational culture is a "multidimensional, multifaceted phenomenon, not easily reduced to a few major dimensions" (Schein, 2010).

While theorists differ in how they define organizational culture, they largely agree on the benefits of a positive organizational culture. The different aspects of organizational culture "produce a distinctive identity of the organization that colors all aspects or organizational life and provides a social integration that goes well beyond formal coordination and command" (Hoy, 1990, p. 156). Robbins (1991) describes how a strong organizational culture can benefit an organization in that a strong culture not only provides a sense of identity to members, but also acts as the social glue that fosters a sense of stability and guidance for members. Bolman and Deal (2008) add that a strong culture tends to increase homogeneity and creates a unifying construct that reduces conflict and political strife. The culture of an organization creates a defined context that members can feel a part of. The identity of the group is based on shared values and norms that help to develop cohesiveness and reduce the likelihood that members will

leave. This sense of belonging to something larger than themselves generates a sense of commitment and loyalty that positively impacts performance (Bolman & Deal, 2008).

Ouchi (1981) demonstrated this finding in his study of highly successful corporations in Japan. He developed Theory Z which focused on how the culture of an entire organization could be developed purposefully through a particular management approach. The Theory Z management style focused on a strong company philosophy, a distinct corporate culture, long-range staff development, and consensus decision-making. The Theory Z corporate culture emphasized shared values, commitment, cooperation, teamwork, trust, loyalty, and egalitarianism. According to Ouchi (1981) these were the conditions necessary for a highly successful corporation.

Deal and Kennedy (1982) put forth a similar idea that a strong organizational culture based on a widely held set of beliefs and values that guide behavior fosters overall organizational effectiveness. They suggested that successful organizations share common cultural characteristics such as a strong organizational philosophy, concern for individuals, rituals and ceremonies, informal rules and expectations, and a belief that what individual employees do is essential to the company.

Hoy and Miskel (2008) synthesized these various definitions and benefits of organizational culture as "a system of shared orientations that hold the unit together and give it a distinctive identity" (p. 177). They further put forth the notion that organizational culture is manifested through assumptions, values, and norms, all of which drive behavior and therefore performance. At the most abstract level, organizational culture can be defined as the collective manifestation of assumptions about the world and

one's place in that world. These assumptions have been collectively developed by members as a useful way to define their organization. At the middle level of abstraction, organizational culture can be defined as the shared values which characterize the organization, giving members a sense of identity and mission. At the most concrete level of abstraction, organizational culture is defined as the development of shared informal behavioral norms and expectations that delineate what type of behavior is desirable for the company to be successful (Hoy and Miskel (2008).

Organizational Climate

Another way that researchers describe the internal processes occurring within business workplaces is through the concept of organizational climate. According to the Merriam Webster Dictionary, the term climate means "the prevailing set of conditions (temperature or humidity) of any given place" (Merriam-Webster collegiate dictionary, 2016). Climate in this view is a way of referring to simultaneously occurring atmospheric features or events (Tagiuri, 1968). In meteorology, climate is described numerically in terms of climatic elements such as temperature, moisture, wind, pressure, precipitation, and more. The climate of a given location is the reporting of the average condition of these elements during a given season or in a given geographic location. The meteorological climate in any given location and at any given time can change based on large or minute changes in any number of its contributing components. It is therefore a synthetically constructed summary concept that brings together many components or dimensions without necessarily detailing each component individually. Descriptions of climate are a good way to make macro generalizations about environments. Extending

the meteorological metaphor of climate, organizational climate has been conceived of as a composite measure made up of a variety of dimensions (Brookover & Erickson, 1975).

As described by Evan (1968), "organizational climate is a multidimensional perception of the essential attributes or character of an organizational system" (p. 110). There are varied opinions as to what dimensions actually make up the concept of organizational climate and that determination tends to depend on the nature of the research being conducted rather than on a universally agreed upon set of concepts (Tagiuri, 1968). Forehand and Gilmer (1964) proposed five dimensions of organizational climate: size and shape, leadership patterns, communication networks, goal directions, and decision-making procedures. Litwin and Stringer (1968) developed an alternative set of dimensions which include responsibility, standards, rewards, organizational clarity, and team spirit. Tagiuri (1968) conducted research on executive climate and determined five major dimensions that contribute to that construct: direction and guidance, professional atmosphere, quality of superiors, qualities of work group, and results, autonomy, and satisfaction.

Some researchers view the concept of organizational climate from a social systems perspective, particularly an open-systems perspective, in that they describe organizational climate in terms of inputs and outputs. Forehand (1968) described organizational climate as being made up of three sets of variables, environmental variables (size and structure), personal variables (aptitudes, attitudes, and motives), and outcome variables (job satisfaction, job motivation, and productivity). Sells (1968) also described organizational climate as being made up of a set of dimensions which align

with an open-systems view of organizations. Those dimensions include objectives and goals, philosophy and value systems, personnel composition, organization, technology, physical environment, social-cultural environment, and temporal characteristics. Although there are differing definitions of organizational climate, Poole (1985) synthesized theoretical and empirical research and came up with some unifying themes:

1. Climate represents collective descriptions by members of a group.
2. Climate serves as a frame of reference for member activity and therefore shapes expectations, attitudes, and behaviors.
3. Climate arises from organizational practices and processes.
4. Organizations tend to have distinct and individualized climates based on their major practices.

Litwin and Stringer (1968) expand Poole's synthesis to include ability to measure. According to these authors, organizational climate is "a set of measurable properties of the work environment, based on the collective perceptions of the people who live and work in the environment" (p. 1). They go on to say that organizational climate is a collection of environmental determinants of human motivation which effect performance. Litwin and Stringer's expanded definition helps to distinguish organizational culture from organizational climate by emphasizing a presumed quantifiable component of the construct. Theorists working from this perspective frequently use organizational surveys of workers, managers, and consumers to quantitatively characterize an organization's climate (Hoy, 1990).

Comparison of Organizational Culture and Climate

Organizational culture and organizational climate are related concepts which often overlap in their efforts to describe the work environment within business workplaces. Both concepts imply that the whole is greater than the sum of its parts (Hoy & Miskel, 2008). Despite their similarity, each offers a different perspective on how to view organizational environments in the context of business workplaces and how to make sense of characteristics that bring about improved performance.

Table 2.1 below illustrates some important differences between the two concepts of organizational culture and organizational climate based on a synthesis of the literature. The table provides a comparison of the two concepts in terms of definition, level of abstraction, theoretical perspective, use as a variable in research, underlying research purpose, typical research methods, and the disciplines that typically use each concept. Major references for each comparison have also been listed.

As described in table 2.1 (Hoy, 1990; Hoy & Feldman 1999; Litwin & Stringer, 1968; Poole, 1985), organizational climate is often described as being less abstract and symbolic than organizational culture. Of note is the presumption that shared perceptions of behavior are more easily measured than shared values, making organizational climate easier to measure empirically than organizational culture (Hoy & Feldman, 1999; Litwin & Stringer, 1968). Another important distinction is that organizational culture is viewed as being more static and therefore less easily changed or manipulated. Organizational climate on the other hand is viewed as being more flexible in that it can be changed or

manipulated (Ouchi & Wilkins, 1985), making organizational climate a more likely candidate for being an independent variable.

Table 2.1

Comparison of Organizational Culture and Climate

	Organizational Culture	**Organizational Climate**	**Reference**
Definition	Consists of shared assumptions, values & norms	Consists of shared perceptions of behavior	Ashforth, 1985; Poole, 1985
Level of abstraction	Abstract & symbolic	Concrete & descriptive	Hoy, 1990; Hoy & Feldman, 1999
Theoretical perspective	Natural system	Rational-systems Social-systems	Hoy, 1990
Use as a variable in research	Culture is viewed as being static and less easy to be changed or manipulated. This makes it well suited to be used as a dependent variable.	Climate is viewed as being flexible and more easily manipulated. This makes it well suited to be used as an independent variable.	Ouchi & Wilkins, 1985
Research purpose	To study and describe the character or atmosphere of organizations	To determine how climate influences organizational outcomes with the goal of determining effective change strategies	Hoy, 1990
Research methods	Usually qualitative and ethnographic	Usually quantitative (e.g., multilevel models or multiple regression)	Hoy, 1990; Litwin & Stringer, 1968
Discipline	Anthropology or Sociology	Organizational Psychology or Social Psychology	Hoy, 1990

School Culture and School Climate

The related concepts of school culture and school climate in the field of education have emerged from the research on organizational culture and organizational climate from the literature on business environments. As with organizational culture and organizational climate, there are varied definitions for school culture and school climate. There is agreement among educators that both school culture and school climate are constructs made up of several dimensions; however, there is little agreement as to which dimensions should be included in the definitions of school culture or school climate. Definitions of school culture and school climate are summarized in tables 2.2 and 2.3 (see appendix A and B) and are reviewed here.

School Culture

Using Hoy and Miskel's (2008) definition of organizational culture as being "a system of shared orientations (assumptions, norms, and values) that holds the unit together and gives it a distinctive identity" (p. 177), we can further define school culture as being the representation of values, norms, professional structures, and orientations that give a school a distinctive identity and ideology (Anderson, 1982; Hoy & Miskel, 2008; Sherblom et al., 2006).

Deal and Kennedy (1982) define school culture as being the shared beliefs and values that bring a community together or "the way we do things around here" (p. 4). Sergiovanni (2000) describes school culture as the "normative glue that holds a particular

school together" (p. 1). According to Sergiovanni, this is achieved by setting forth an organization-wide guiding philosophy which guides member behavior.

McLaughlin and Talbert (2006) define three facets of school culture which inform student and teacher opportunities to learn. They describe the technical culture (views about students, ideas about subject content, beliefs about student learning, and understanding of effective pedagogy and assessment), professional norms (collegial relationships, views of professional expertise, and conceptions of career), and organizational policies (criteria for course and class assignments and resource allocation). According to McLaughlin and Talbert (2006) each of these impact student and teacher outcomes.

Strong school cultures can help to socialize new teachers by reinforcing norms of practice and affirming expectations for instructional consistency (McLaughlin & Talbert, 2006). Sergiovanni (2000) argues that a strong school culture leads to a sense of individual and community commitment, which in turn can perpetuate improved personal and overall achievement. As with organizational culture, school culture is usually perceived as a consequential, though relatively abstract and difficult component of schools to assess or change. For this reason, the literature on school climate is reviewed next.

School Climate

Because school climate has been described as being a concrete, measurable, and malleable component of schools, considerable efforts have been made in the literature to define it, measure it, and estimate its effects on educational outcomes. While the

literature has not arrived at a uniform definition or measure of school climate, it does provide insights into the perceived importance of school climate as an educational intervention.

Historical Perspectives

Discourse on what is now called school climate has been going on for many years. In 1892, Felix Adler stated that "the very atmosphere of the class room should be such as to encourage moral refinement; it should possess a sunny climate, so to speak, in which meanness and vulgarity cannot live" (p.33). He went on to say that this atmosphere is comprised of the physical environment, teaching methods, and teacher qualities. In 1896, George Howland stated that "the order, the industry, and the culture of our schools, though indirect and often unconscious, are yet efficient and ever-present moral influences which we cannot well overestimate" (p. 8).

Although not mentioning school climate directly, Perry (1908) was the first educator to write in detail about aspects of schools and the process of learning that today would be considered integral dimensions of school climate. In his book *The Management of a City School*, Perry describes how "the whole atmosphere of a school is largely dependent upon the attention given by the competent principal to matters of detail" (p. 2). He goes on to describe the many responsibilities of the principal in effectively managing a city school. Of particular interest here are his descriptions of how a principal must concern himself or herself with material equipment, physical welfare of students, scholastic progress, and moral development. Regarding material equipment he in particular notes the importance of paying close attention to the design of the actual school

building, the nature of supplies, and the suitability of decorations. He clearly understands the importance of the physical environment of a school and states that:

> Although it is quite impossible to reduce to any mathematical ratio the extent to which pupils are affected by the quality of their material environment, nevertheless it must be admitted that they are distinctly influenced by their surroundings, and that it becomes a duty of the school to provide something more than mere 'housing'. Even the most wretched of schoolrooms admits of some decorative treatment which will reduce the ill effects of the cheerless atmosphere. (Perry, 1908, p. 140)

For Perry, the physical or material environment of a school could either facilitate learning or prove a barrier to achieving a school's academic and moral goals.

Regarding the responsibility of a principal to consider the physical welfare of students, Perry (1908) in particular notes the importance of paying close attention to general care and hygiene, physical protection, and safety issues pertaining to supervision and mobility around the school. In describing important aspects for a principal to consider regarding the scholastic progress of students, Perry (1908) in particular describes aspects of admissions, grading, planning, promotion, teacher preparation, teaching practices, and curriculum as playing a large role in student learning and outcomes. Concerning student moral development Perry (1908) discusses discipline, attendance and punctuality, habits and ideals, and school spirit as being important for a principal to consider. He describes the need for a principal to create a school atmosphere that takes into account pride in the school, the physical environment, teaching methods, and personal qualities of teachers. In particular, he emphasizes the need for teaching manners, politeness, cleanliness, and honesty, as a means to moral ends.

Similar to Perry, Dewey (1927) wrote about the social dimension of school life and how schools should enhance skills, knowledge, and dispositions that support the

development of engaged democratic citizens. While he does not mention school climate specifically, his writings encourage the creation of a democratic ethos in schools, a social dimension of school life that could easily be referred to as a school's climate.

Multiple Contemporary Perspectives

Ellis (1988) stated that "school climate is a popular metaphor for a complex phenomenon that is easy to perceive but formidably difficult to define, measure, or manipulate" (p.1). Brookover and Erickson (1975) defined school climate as the "composite of variables as defined and perceived by the members of this group" (p. 364) and later, Hoy, and Clover (1986) defined school climate as a group of measurable properties of the work environment of teachers and administrators based on their collective perceptions.

Sherblom et al. (2006) describe school climate as the "lived embodiment and experience of how a school is organized, how people relate to one another, and the kinds of relationships that are institutionally supported" (p. 20). Hoy and Miskel (2008) add to this by defining school climate as "the set of internal characteristics that distinguish one school from another and influence the behavior of each school's members" (p. 198). Hoy and Miskel (2008) adapted Tagiuri's (1968) definition of organizational climate and state that "school climate is the relatively enduring quality of the school environment that is experienced by participants, affects their behavior, and is based on their collective perceptions of behavior in schools" (p. 198).

Tagiuri's (1968) formulation of school climate includes the ecology (physical and material aspects of the school), the milieu (the social aspects of individuals and groups),

the social system (patterns of relationships between individuals and groups), and the culture (belief system and values). In this view, school culture is a dimension of school climate. Stewart (2008) used a similar conception of school climate in his research and defined school climate as being made up of three dimensions: school culture (unwritten beliefs, values, attitudes, and relationships), school organizational structure (class and school size), and school social milieu (background characteristics of students and faculty).

Hansen and Childs (1998) describe a positive school climate as an environment of support, encouragement, warmth, and acceptance where students are valued and have a sense of safety and belonging and where teachers and students have trusting, respectful, and caring relationships. Brown, Anfara, and Roney (2004) based their research of school climate on the following school climate dimensions: academic emphasis, teacher affiliation, collegial leadership, resource support, and institutional integrity. Ben-Peretz, Schonmann, and Kupermintz (1999) have stated that the dimensions making up a school's climate are interpersonal relations, norms of behavior, levels of autonomy, styles of leadership, sense of belonging, job satisfaction, and status.

Freiberg and Stein (1999) describe school climate as "the heart and soul of the school…the quality of a school that helps each individual feel personal worth, dignity, and importance, while simultaneously helping to create a sense of belonging to something beyond ourselves" (p. 11). In this view, the climate of the school is that which develops a commitment to that school by staff and families creating the foundation for high performance by all stakeholders. As stated by Sweetland and Hoy (2000), "climate is to organization as personality is to individual" (p. 705).

The National Association of Elementary School Principals (2015) argues that principals must establish a positive school climate that fosters the emotional, social, and physical safety of each child. Similarly, the U.S. Department of Education's National Center on Safe Supportive Learning Environment's model of school climate includes three inter-related aspects of school climate (U.S. Department of Education, n.d.). The first is student engagement and includes relationships, respect for diversity, and school participation. The second is safety which includes physical safety and substance use. The third is school environment which includes physical environment, academic environment, wellness, and disciplinary environment.

The National School Climate Center (NSCC) has synthesized much of the research on school climate and has developed a model that states that school climate is made up of four dimensions: safety, teaching and learning, interpersonal relationships, and institutional environment, each of which are made up of additional subdimensions (see appendix A). The National School Climate Center based their Comprehensive School Climate Inventory (CSCI) on these four dimensions. According to the NSCC (NSCC, n.d.), school climate is defined as the quality and character of school life as experienced by students, personnel, and families. In this view, school climate sets the tone in a building and provides the context within which teaching and learning takes place.

Despite the fact that there is no established uniform definition or measure of school climate, the current study relies on the NSCC's definition and measure of school climate, the CSCI. NSCC's definition and identification of the four dimensions listed above, is a comprehensive reflection of current research in school climate and the

dimensions that comprise it. NSCC's model is very similar to the description of school climate provided by Wang and Degol (2016) derived from their recent review of 327 articles on school climate. Their model includes academic, community, safety, and institutional environment. In addition, the literature review on school climate and student achievement shows a significant number of studies that can be grouped according to NSCC's four dimensions making it a useful and representative definition.

The CSCI was developed by the National School Climate Center (NSCC, n.d.) in 2002 following scientifically sound and established protocols that support the development of reliable and valid surveys. The CSCI is considered to be one of the top school climate surveys in the field and has been vetted by the National School Climate Council, independent reviewers, and a core group of researchers, educators and policy leaders (Clifford, Menon, Gangi, Condon, & Hornung, 2012; Gangi, 2010; Guo, Choe, and Higgins-D'Alessandro, 2011); Haggerty, Elgin & Woolley, 2010; Olsen, Preston, Algozzine, Algozzine and Cusumano 2018). The U.S. Department of Education's National Center on Safe Supportive Learning Environments also recognizes the CSCI as a reliable and valid measurement tool (U.S. Department of Education, n.d.). Developed over years of research and field testing, the CSCI is used by thousands of schools, districts, and networks of schools and several State Department of Education (Ohio and Iowa). The CSCI is used in this study as a rigorous measure of school climate.

School Climate Today

In response to a lack of conceptual consensus in the literature on school climate, Rudasill, Snyder, Levinson, and Adelson (2018) have proposed a Systems View of

School Climate (SVSC) which attempts to provide a framework for understanding school climate that provides guidance for further research. They derived this theoretical framework from deconstructing prior models and empirical research on school climate into themes and then identifying their assumptions. The SVSC framework begins as a series of systems nested inside of each other with the individual student as the smallest unit in the center. They identify multiple systems that overlap and interact (family, peers, community, classroom, school structures, and school processes) that work to support or detract from students' experiences in school. Using the SVSC to synthesize existing research, they define school climate as "the affective and cognitive perceptions regarding social interactions, relationships, values, and beliefs held by students, teachers, and administrators, and staff within a school" (p. 36). Their systems-based framework guides the development of causal models based on empirical testing of school climate as it relates to other constructs such as student achievement.

Wang and Degol (2016) conducted a thorough review of the construct, measurement, and impact of school climate on student outcomes. They reviewed 327 studies and arrived at a multidimensional description of school climate. In their review they found that school climate was defined in four ways: academic, community, safety, and institutional environment. Academic environment described the overall quality of the academic atmosphere; community environment described the quality of interpersonal relationships with the school; safety environment represented the degree of physical and emotional security provided by the school; institutional environment reflected the organizational or structural features of the school environment. They describe these four

dimensions as encompassing those features of the school environment that influence student cognitive, behavioral, and psychological development.

In their review of 206 studies, Thapa, Cohen, Guffey, and Higgins-D'Alessandro (2013) determine that the National School Climate Council's definition of school climate may be a good summarizing statement as it encompasses the five essential dimensions of school climate that they reviewed: safety, relationships, teaching and learning, institutional environment, and the school improvement process. The National School Climate Council (2007) states that school climate is based on people's experience of school life, to include norms, goals, values, interpersonal relationships, teaching and learning practices, and organizational structures.

These recent studies and reviews of the literature on school climate have confirmed that school climate is a multidimensional and malleable construct. This study seeks to pinpoint features of school climate that have relationships with student achievement and to further identify for which groups of students these relationships are the strongest.

Measures of School Climate

While Ellis (1988) described school climate as being difficult to measure and manipulate, much work has been done to develop valid measures of school climate and promote their use as indicators for school improvement. Empirically grounded school climate research actually began in the 1950's when Halpin and Croft (1963) developed the Organizational Climate Description Questionnaire (OCDQ), which was a survey designed for staff to complete with the intention of portraying the organizational climate

of elementary schools. The OCDQ measured four teacher behaviors (disengagement, hindrance, esprit, and intimacy) and four principal behaviors (aloofness, production emphasis, thrust, and consideration) as perceived by teachers. Over the past few decades, other school climate surveys have been developed and deployed to students, staff, and parents to document and describe the shared perceptions of climate in schools.

Hoy and Feldman (1987) developed the Organizational Health Inventory (OHI), which in its current form for elementary schools assesses academic emphasis, collegial leadership, institutional integrity, resource influence, and teacher affiliation. The secondary school version assesses academic emphasis, consideration, institutional integrity, initiating structure, morale, principal influence, and resource support. The OHI measures dimensions of organizational effectiveness to identify strengths and diagnose weaknesses in a school, so as to help educators and policymakers develop school improvement plans.

The National School Climate Center (NSCC, n.d.) developed the Comprehensive School Climate Inventory (CSCI), which is designed to measure shared perceptions of the school community and to reveal how students, school personnel, and parents feel about the school environment. Based on the NSCC's model of school climate, the CSCI for students assesses four dimensions: safety, teaching and learning, interpersonal relationships, and institutional environment, each of which are made up of additional subdimensions (see appendix C). These dimensions are very similar to the description of school climate by Wang and Degol (2016) derived from their recent review of 327 articles on school climate. The CSCI is used in this study as a rigorous measure of school climate.

Safety is the first climate dimension measured by the CSCI, and includes the subdimensions of rules and norms, sense of physical security, and sense of social-emotional security. Whether or not people feel safe in a particular location depends on one's sense of physical, social, and emotional safety. According to Maslow (1943) safety is the second most important human need and comes directly after one's need for food and water. Devine and Cohen (2007) found that when children feel safe, their ability to learn increases as does their potential for healthy development. Research has shown that schools with a positive school climate tend to have fewer delinquent behaviors (Gottfredson, Gottfredson, Payne, & Gottfredson, 2005), less violence (Goldstein, Young & Boyd, 2008; Karcher 2002; Littrell, Peterson & Sunde, 2001), and fewer instances of bullying (Higgins, 2005; Meyer-Adams & Conner, 2008; Yoneyama & Rigby, 2006), all of which contribute to one's sense of safety in school and therefore one's ability to perform.

The second climate dimension measured by the CSCI is the nature of teaching and learning, which includes the subdimensions of support for learning and social and civic learning. Teachers spend many hours per day with their students and therefore have the opportunity and the responsibility to influence children for the better. Teachers can impact students through the way they communicate with them, treat them, and teach them. Teaching practices have the potential to transmit important messages about academic expectations and what types of students and behaviors are valued. Particular pedagogical approaches have been shown to directly improve the learning environment as well as student achievement. Ghaith (2003) demonstrated that cooperative learning (as compared to competitive groupings and individual work) helped students to feel that they

are treated more fairly and graded more fairly. Students also experienced a greater sense of class cohesion and social support. These directly impacted their achievement. It has also been demonstrated that service learning projects that allow students to apply classroom material to real life situations help to develop cooperation skills and the ability to share ideas (Ghaith, 2003; Wentzel & Watkins, 2002), which also contribute to improved student achievement. Similarly, purposeful social emotional learning initiatives that strive to develop particular social skills in children through character education and other approaches have been shown to improve student achievement scores significantly (Benninga, Berkowitz, Kuehn & Smith, 2003; Elias & Haynes, 2008).

The third climate dimension measured by the CSCI is the nature of relationships, which includes the subdimensions of respect for diversity, social support for adults, and social support for students. People tend to thrive in work settings where they feel valued and acknowledged. Wentzel (1997) demonstrated that when students perceived that their teachers cared about them, their pursuit of prosocial goals and academic effort were significantly increased. This confirms that students work hard for teachers with whom they connect and in environments where they feel acknowledged. Further research has shown that students thrive in schools where they feel cared about and experience a sense of belonging (Osterman, 2000). Feeling accepted has been shown to positively influence many aspects of student behavior such as attendance (Gottfredson & Gottfredson, 1989) and delinquent behavior (Chen & Weikart, 2008). These in turn have a positive effect on student achievement.

The fourth climate dimension measured by the CSCI is the nature of the institutional environment, which includes the subdimensions of school

connectedness/engagement and physical surroundings. Children spend many hours in school and the physical environment of the school has been shown to impact student outcomes. Much research has been conducted to examine the impact of school size on student outcomes. McNeely, Nonnemaker, and Blum (2002) have shown that smaller schools are positively correlated with school connectedness, which can lead to better academic performance. School size can be controlled by breaking large schools into smaller learning communities as a way to improve the learning environment (Cotton, 2001). The physical environment can have a strong impact on students' sense of safety, which also directly impacts student achievement. Aspects such as adult supervision, classroom layout, and schedules have been shown to influence student behaviors and feelings of safety in schools (Conroy & Fox, 1994). Specific school features such as lighting, air quality, cleanliness, climate control, acoustical control, and building layout have also been shown to impact school climate and student achievement (Uline & Tschannen-Moran, 2008).

School Climate and Outcomes

Using a range of measures of school climate, researchers have found positive school climate to positively influence adult and child behavior and performance. Regarding adult behavior, a positive school climate has been shown to enhance teacher practice through professional collaboration and dialogue (Ghaith, 2003), as well as improve teacher retention (Chauncy, 2005). For students, positive school climate has been shown to reduce violence and aggressive behavior (Karcher, 2002), bullying (Meyer-Adams & Conner, 2008), substance abuse (LaRusso, Romer & Selman, 2008), student absenteeism (Gottfredson & Gottfredson, 1989), and rate of student suspension

(Wu, Pink, Crain & Moles, 1982); it also has been found to improve student self-esteem and self-concept (Cairns, 1987; Hoge, Smit & Hanson, 1990), student motivation to learn (Eccles, Wigfield, Midgley, Reuman, MacIver & Feldlaufer, 1993), and student achievement (Brookover et al., 1978; Chen & Weikart, 2008; Cohen et al., 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil et al., 2009; Pallas, 1988; Ross et al., 2007; Shann, 1999; Sherblom et al., 2006; Sweetland & Hoy, 2000; West, 1985).

A large body of research has shown that a positive school climate is critical to developing effective risk prevention and health promotion initiatives (Cohen, 2001) that reduce the risk of illegal substance use, promiscuity and violence. In this view, school climate acts as a protective factor that helps to create optimal teaching and learning environments in schools as well as improved student outcomes.

Some researchers have defined school climate in terms of its potential to affect student outcomes and behaviors. Lezotte et al. (1980) define school climate as "the norms, beliefs and attitudes reflected in institutional patterns and behavioral practices that enhance or impede student achievement" (p. 4). They add that every aspect of the educational environment has the potential to positively or negatively affect school climate and therefore student outcomes. Crow, Hausman, and Scribner (2002) describe a positive school climate as one with a shared commitment to student achievement, collaboration between staff, and a school organization that brings teachers together in their daily work.

School Climate and This Study

Similar comparisons can be made between school culture and school climate as between organizational culture and organizational climate in the business world. While both school culture and climate can be used as dependent or independent variables, a distinction is made for the purpose of the current study. As described in the literature review, school culture is generally viewed as a static or passive construct that is made up of informal and often abstract values and norms. In this view, school culture is generally viewed as a dependent variable that is difficult to change or manipulate. On the other hand, school climate is viewed as a more concrete construct that is made up of specific, often more formal behaviors and actions that can be purposefully manipulated over time with specific interventions (Moos, 1979). In this view, school climate is generally viewed as an independent variable which can be manipulated. For these reasons and for the purpose of this study, school climate is examined in relation to student achievement outcomes.

In summary, researchers have concluded that school climate is made up of a complex set of dimensions, each effecting different aspects of student learning (Brookover & Erickson, 1975). From most perspectives, school climate is a broad term that incorporates teacher, student, and family perceptions of the formal and informal environment in a school. A positive and healthy school climate develops an optimal teaching and learning environment that fosters positive youth development and enhanced learning. As a result, school climate has the potential to positively influence student outcomes, and more specifically student achievement. As stated by Freiberg (1999),

"School climate is much like the air we breathe – it tends to go unnoticed until something is seriously wrong" (p.1). The research is clear however that whether a school's climate develops accidentally or purposefully, it has serious implications for the emotional, behavioral, and academic outcomes for students.

School Climate and Student Achievement

Educators have acknowledged the importance of school climate for many years (Adler, 1892; Dewey, 1927; Howland, 1896; Perry, 1908). However, it was not until the 1950's that school climate was studied systematically thanks to the development of scientifically sound school climate assessment tools. With the advent of school climate assessment tools such as the Comprehensive School Climate Inventory (NSCC, n.d.), the Organizational Health Inventory (Hoy & Feldman, 1987), and the Organizational Climate Description Questionnaire (Halpin & Croft, 1963), research on school climate has flourished. Research has shown that school climate is linked to educational outcomes such as student achievement and that it also impacts overall student and staff performance (Brookover et al., 1978; Chen & Weikart, 2008; Cohen et al., 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil et al., 2009; Pallas, 1988; Ross et al., 2007; Shann, 1999; Sherblom et al., 2006; Sweetland & Hoy, 2000; West, 1985). In their definition of school climate, Lezotte et al. (1980) emphasize that school climate is made up of many different dimensions and that all dimensions of school climate can be directly tied to observable student outcomes. Despite a lack of agreement as to which dimensions constitute school climate, there is an understanding that school climate is a multi-faceted construct that impacts student outcomes.

As described by Cohen et al. (2009), we are still learning about how positive school climate is related to academic achievement and positive youth development. In general terms, positive school climate creates an environment in schools where student and staff needs are acknowledged and responded to in order to create an optimal teaching and learning situation. There is compelling evidence that safe, caring, and responsive school climates foster greater attachment to school and provide the foundation for optimal social, emotional, and academic learning (Blum, McNeely, & Rinehart, 2002; Osterman, 2000). Students who **c**are about and feel supported by their teachers and friends are more likely to develop strong ties to their school and to feel a strong connection to their school. As students develop a sense of attachment and commitment to their school, they tend to display more socially acceptable behavior, conform to the values of the school, and care more about their schoolwork. These are the students who tend to have higher GPA's (Stewart 2008).

Berkowitz, Moore, Astor, and Benbenishty (2017) have synthesized the research around socioeconomic background, inequality, school climate, and student achievement. Their research points to a number of things to consider when drawing conclusions from the literature on school climate and student achievement. It is important to determine how climate is being defined, what research methods are being used, and what constitutes the sample. Then it is important to consider whose perception is being researched. – e.g., the students, teachers, staff, leadership, parents or some combination. Next it is important to consider the unit of analysis. In other words, is data being collected and reported at the individual (student or adult), class (aggregates of students within classrooms), school (aggregates of students and adults within schools) or district

(aggregates of students and adults across a district) level. Finally, the key findings need to be identified.

Table 2.4 (see appendix D) lists the empirical studies reviewed in this section. Taken mostly from peer-reviewed journals and major reports, a total of 28 empirical studies were reviewed that examine the relationship between various aspects of school climate and student achievement. Consistent with the recommendations of Berkowitz et al. for each study reviewed the table provides the definition of school climate utilized by the authors, research methods, characteristics of the sample, measurement perspectives collected, units of analysis, and key findings. Limitations of each study have also been listed in the table.

In presenting the studies below, the research on the relationships between different school climate dimensions and student achievement is reviewed first, and specifically whether there are any differences in these relationships for reading and mathematics achievement. Next research examining the relationships between perceptions of different school climate dimensions and student-level factors such as race/ethnicity, gender, and grade level/age is reviewed. The section ends by reviewing research that explores the relationship between student-level factors, different school climate dimensions, and student achievement.

School Climate Dimensions and Student Achievement

One of the challenges of reviewing the literature on school climate and student achievement is how to organize it, because there is no agreed upon list of dimensions that

constitute a school's climate. To address this challenge, the studies reviewed here are loosely organized according to NSCC's four major dimensions of school climate: safety, teaching and learning, interpersonal relationships, and institutional environment.

Safety

The first major school climate dimension described by NSCC is safety. It is comprised of three sub-dimensions: rules and norms, sense of physical security, and sense of social-emotional security. This climate dimension includes student perceptions of clearly communicated rules, clear and consistent norms, and sense of physical and emotional safety. In their large nationwide study of high school students, Kwong and Davis (2017) found that at the individual-level, student perceptions of school safety were highly predictive of academic success. Ma and Klinger (2000) studied the relationship between disciplinary climate, academic press, parental involvement, and student achievement in 6th grade students. They found that of the three climate dimensions that they studied, the relationship between disciplinary climate and student achievement was significant for mathematics, science, and writing but not for reading. Their definition of disciplinary climate included rules and consequences, student behavior, and how students treated one another.

Kraft and Marinell (2016) studied the impact of leadership and professional development, high academic expectations, teacher relationships and collaboration, and school safety and order, on teacher turnover and student achievement. They found robust relationships between the four dimensions they studied and teacher turnover. They also found that improvements in a schools' safety and order corresponded to improvements in

student's mathematics achievement but not English Language Arts achievement. Brand, Felner, Seitsinger, Burns, and Bolton (2008) found that lower levels of disruptiveness and safety problems were found to be related to students' performance on reading and mathematics tests.

Griffith (1997) found that schools that provided orderly social environments led to higher quality teaching and learning and higher levels of student satisfaction and academic performance. Shindler, Jones, Williams, Taylor, and Cardenas (2016) similarly found that there was a substantive correlation between classroom discipline practices and achievement. They further determined that dimensions of school climate were highly correlated to each other indicating that they were strongly interdependent. They concluded that change within one discrete dimension of school climate would influence the effects of the others. In addition the implication here is that a whole school approach may be more effective than implementation of isolated, de-contextualized programs.

Teaching and Learning

The second major school climate dimension described by NSCC is teaching and learning. It is comprised of two sub-dimensions: support for learning and social and civic learning. This climate dimension includes use of supportive teaching practices, varied opportunities to demonstrate knowledge and skills, support for independent thinking and questioning, academic challenge, and individual attention. This climate dimension is similar to what many studies refer to as academic emphasis. Goddard, Sweetland, and Hoy (2000) define academic emphasis as a collective measure of school climate in which teachers believe that their students have the capabilities to achieve, students work hard to

succeed, students are respected for their academic accomplishments, and the learning atmosphere is orderly and serious. In their study of urban elementary schools, Goddard et al. (2000) found that academic emphasis was a strong predicator of mathematics and reading achievement. Sweetland and Hoy (2000) demonstrated that the two strongest climate predictors of teacher empowerment were collegial leadership and academic press. They found that teacher empowerment was related to higher levels of organizational effectiveness, which included measures of mathematics and reading in middle school students.

Gaziel (1997) studied high schools serving disadvantaged students and found that of the six school climate dimensions studied (academic emphasis, continuous school improvement, orderliness, teamwork, adaptation to customers' demands, and student participation) academic emphasis was the strongest predictor of academic achievement and was found in highly effective schools. Following academic emphasis the next strongest predictors of academic achievement were continuous school improvement and orderliness. He further found that average schools valued orderliness, teamwork, and only then academic achievement. These differences in emphasis and priorities affected the schools' scholastic achievement. Another finding of this study indicated that those schools that placed a greater emphasis on academic achievement were more able to attain an orderly atmosphere. This suggests that although orderliness is important in schools, it may not be enough to bring about academic improvements. These findings give important information to educators regarding how to prioritize school climate development efforts.

Hoy and Hannum (1997) studied the impact of school climate on student achievement from the organizational health perspective as characterized by three levels of control: technical level (academic emphasis and teacher affiliation), managerial level (collegial leadership, resource support, and principal influence), and institutional level (institutional integrity). They found that some dimensions of organizational health were significantly related to student achievement in reading, writing, and mathematics in a sample of middle schools even when socioeconomic status was controlled. Using data that was aggregated at the school-level, they found that teacher reported academic emphasis, resource support, and teacher affiliation, made independent contributions to the achievement of students. They defined academic emphasis as consisting of an orderly and serious learning environment in which students completed their homework.

Interpersonal Relationships

The third major school climate dimension described by NSCC is interpersonal relationships. This climate dimension includes respect for individual differences, caring adult relationships with students, and supportive peer relationships. Esposito (1999) found that the school climate dimension with the strongest relationship to student academic and social development was the teacher/student relationship. The teacher/student relationship especially showed an important impact on children's school adjustment, which in turn showed a relationship to increased mathematics and reading achievement scores as well as social skill development such as cooperation and assertiveness. Ruus et al. (2007) found that teachers' attitudes towards students as perceived by the latter helped students to develop positive coping strategies and an

optimistic outlook about the future. They stated that these were necessary conditions to bring about academic success and prosocial behavior.

Shann (1999) found that positive perceptions of teacher caring and commitment corresponded to higher rates of academic achievement. She further found that the highest achieving school in her study combined an emphasis on academics with a culture of caring. She postulated that school climate based on a culture of caring may actually be a necessary condition for maximal school achievement. Buckley, Storino, and Sebastiani (2003) found that school climate significantly predicted GPA across gender and ethnicity, with the perception of school support functioning as the key school climate indicator.

Sherblom et al. (2006) examined the relationship between school climate dimensions and 3rd and 4th grade mathematics and reading scores on standardized tests. They found that the school climate elements of students' perceptions of the classroom community, their sense of wellbeing, and their concern for others were strongly related to mathematics and reading proficiency. In addition, they found that teacher and staff feelings of belonging, leadership support, and collaboration were all strongly related to 3rd and 4th grade proficiency in mathematics and reading. In addition to the overall relationship between school climate and student achievement, they provided some specific findings regarding which particular perceptions of student and staff school climate had stronger relationships with mathematics scores and reading scores. They found that students' sense of well-being at school and teacher-staff feelings of belonging were strongly correlated to both mathematics and reading scores. They also found that a positive classroom community, affective liking of school, trust/respect for teachers,

concern for others, school leadership, parent-teacher relations, and school expectations were strongly correlated with reading scores only.

Hoy and Hannum (1997) found that teacher affiliation or the extent to which teachers showed their commitment to their students and their peers made significant contributions to academic achievement. Brand et al. (2008) found that positive peer relationships were found to be related to students' performance on reading and mathematics tests. Similarly, Stewart (2008) studied the influence of individual-level and school structural variables on student achievement in a sample of 10^{th} grade students sampled from the National Educational Longitudinal study database. The findings from this study showed that student reported individual-level predictors, such as associations with positive peers, were significantly associated with student achievement. The one school structural variable that was found to be significantly related to student achievement was school cohesion or sense of belonging which is associated with NSCC's fourth climate dimension of institutional environment.

Institutional Environment

The fourth major school climate dimension described by NSCC is institutional environment. It is comprised of two sub-dimensions: school connectedness/engagement and physical surroundings. This climate dimension includes issues of identification with school, participation, cleanliness, and order. Macneil et al. (2009) studied 29 schools that were categorized as Exemplary, Recognized, or Acceptable. They explored the effects of school climate on student achievement in these schools and found that goal focus and adaptation were most effective in discriminating between the cultures of Recognized and

Acceptable Schools. Goal focus was defined as the ability of persons, groups, or organizations to have clarity, acceptance, and support of goals and objectives. Students achieved higher scores on standardized tests in schools with healthy learning environments. Similarly, Ruus et al. (2007) found that there was a relationship between the school value system as perceived by students and academic success.

Reynolds, Lee, Turner, Bromhead, and Subasic (2017) found that school identification (connectedness, belonging, and relatedness) fully mediated the relationship between school climate and academic achievement with a significant indirect effect on numeracy and writing scores but not reading scores. School identification emerged as an important predictor of academic achievement both directly and by creating an indirect effect of school climate on achievement.

There are several other studies that found a relationship between physical surroundings and resources on student outcomes. Hoy and Hannum (1997) found that resource support, or the availability of extra materials when requested and teachers being provided with adequate materials for their classrooms, made significant contributions to academic achievement. Zamora and Hernandez (2016) studied the impact or organizational health (OH) on student achievement in a high needs district. They found that the strongest relationships between reading achievement and the ten OH dimensions existed with morale, resource utilization, and goal focus. The strongest relationships between mathematics achievement and the ten OH dimensions existed with morale, autonomy, and goal focus. Kwong and Davis (2017) found that at the individual level, student perceptions of the student learning environment were highly predictive of

academic success. At the school level, institutional facilities were significantly predictive of mathematics and reading scores.

School Climate Dimensions and Student-Level Factors

The relationships between perceptions of different school climate dimensions and student-level factors such as race/ethnicity, gender, and grade level/age are explored here. In their study of elementary age students, Battistich, Solomon, Kim, Watson, and Schaps (1995) found that grade, ethnicity, and gender effects existed on students' attitudes, motives, beliefs, and behavior. In particular, older students tended to score higher in concern for others, sense of autonomy, sense of efficacy, and democratic values but lower in conflict resolution skills, intrinsic prosocial motivation, and general self-esteem. Regarding ethnicity, White students had consistently higher average scores than African American, Hispanic, Asian, Native American, and Alaskan Native students with the largest difference being for democratic values. Gender differences showed modest positive effects favoring girls for conflict resolution skills, intrinsic prosocial motivation, and concern for others. Girls also scored slightly higher than boys in acceptance of outgroups, democratic values, and altruistic behavior but slightly lower than boys for sense of efficacy and general self-esteem.

La Salle, Sabek, and Meyers (2016) studied a large sample of 4th and 5th grade students. They found that student grade, gender, and race/ethnicity were significantly related to student perceptions of school climate. They found that the majority of variance in elementary student perceptions of school climate was accounted for by student-level variables including gender, race/ethnicity, and grade. In particular, males and ethnic

minority students reported less favorable perceptions of school climate in comparison to girls and White students, respectively. Furthermore, 4th grade students reported higher perceptions of school climate then 5th grade students.

Similarly, in their study of 5th grade students, Koth, Bradshaw, and Leaf (2008) found that individual-level factors (race and gender) accounted for the largest proportion of variance in perceptions of school climate as compared to school-level factors (school size, faculty turnover, student mobility, and rate of free or reduced-price meals) and classroom-level factors (clusters of students with behavior problems, class size, teacher experience, and order and discipline). They found that male and minority students tended to perceive the school less favorably. Male students reported less order and discipline and lower levels of achievement motivation.

In their study of adolescent perceptions of school climate, Way, Reddy, and Rhodes (2007) identified gender and age differences in perceptions of the four climate dimensions studied (teacher support, peer support, student autonomy in the classroom, and clarity and consistency in school rules). In particular, perceptions of all four dimensions of school climate declined over the three years of middle school. Although students reported declines in each of the four dimensions of school climate, girls reported sharper declines in peer support than boys over time.

Kuperminc, Leadbeater, Emmons, and Blatt (1997) found gender differences in early adolescents' responsiveness to their environments at school. Defined as the quality and frequency of students' perceived interactions with adults and other students, school climate perceptions accounted for independent variance in all multi-informant

assessments of boys' externalizing and internalizing problems. For girls, school climate perceptions were independently associated only with self-reported externalizing problems.

In her study of students in a secondary school in Australia, Yates (2003) found that of the climate dimensions she studied (cohesiveness, friction, satisfaction, competitiveness, and difficulty) gender was directly and significantly related to cohesiveness, friction, and satisfaction, with girls feeling more cohesive and more satisfied with school life than boys, but with boys perceiving a higher level of friction than girls.

School Climate Dimensions, Student-Level Factors, and Student Achievement

An exploration of the relationships between school climate dimensions, student-level factors, and student achievement is described here. Brookover et al. (1978) found that a somewhat different set of school climate dimensions contributed more highly to mean school achievement in majority Black schools than in majority White schools. In majority Black schools, the teachers' commitment to improve their teaching practice was the second most influential climate dimension after students' sense of academic futility. This dimension made more of a difference in achievement in majority Black schools than in majority White schools. After the student sense of academic futility, the climate dimensions that accounted for the most variance in school achievement in majority White schools included student academic norms, the teachers' evaluations and expectations, and the principal's effort to improve. These findings make the case for the importance of

determining which aspects of school climate support or hinder optimal school performance, specifically for young, urban, minority students.

In her study of middle school students, Shann (1999) assessed the relationships between school achievement and prosocial and antisocial behaviors in four urban middle schools. She further wanted to determine whether a caring environment was consistent with higher rates of prosocial behaviors and lower rates of antisocial behaviors among students. To assess a culture of caring, students rated the following three dimensions: teacher commitment to students, teacher relationships with others, and cooperation among students. She demonstrated that the highest achieving school in her study combined an emphasis on academics with a culture of caring that was reflected in higher rates of prosocial behaviors and lower rates of antisocial behaviors among students. Positive perceptions of teacher caring and commitment corresponded to higher rates of academic achievement. She found that school climate based on a culture of caring may actually be a necessary condition for maximal school achievement.

Furthermore, Shann (1999) found differences by grade, gender, and race on perceptions of the culture of caring. For "teacher commitment to students" 7th and 8th graders' perceptions were significantly more negative than 6th graders. Furthermore, male assessments of the quality of education and care provided by teachers declined across grade levels whereas the assessment by females declined in 7th grade and improved in 8th grade. For "teacher relationships with others" a composite of students' perceptions of whether their teachers seemed to like each other, the principal, and the students, was created. Students in 6th grade had significantly more positive views about their teachers liking others than did students in grades 7 and 8, females had more positive

views than males, and Hispanic students had more positive views in their assessment than Blacks, Asians, and "others". For "cooperation among students," students in the 6th grade were more positive in their assessments of students' cooperative, friendly behaviors than students in grades 7 and 8, females views were significantly more positive than males and White and Black students perceived significantly lower levels of cooperation in their schools than did Hispanic and Asian students. An important finding was that students in higher grades perceived more antisocial behaviors and fewer prosocial behaviors than 6th graders whose outlook appeared to be more positive. These findings indicate that there appeared to be a decline in students' positive outlook over time. This would indicate that schools need to develop interventions which address the decline in students' positive outlook which occurs as they get older. Differences were also found in school climate perceptions of female students if they attended schools with higher number of females than males. Differences were similarly found in school climate perceptions of racial minorities if they attended schools where the school makeup was mostly minority students as opposed to if they attended schools where they were actually in the minority.

Shindler et al. (2016) studied the relationship between school climate and student achievement in urban school districts. They found that achievement was shown to be highly correlated to overall mean school climate. In addition achievement was shown to correlate with all eight climate dimensions of school appearance and physical plant, faculty relations, student interactions, leadership, decision making, discipline environment, attitude and culture, and school-community relations. They found a very substantial correlation between classroom discipline practices and student achievement. Furthermore, they found that the quality of school climate decreased as students moved

from the elementary to the secondary school level. The implication here is that as students get older, their perceptions of the climate in their school get worse.

Buckley et al. (2003) studied the impact of school climate as defined by a well-kept school, supportive school, and unsafe school on student achievement for middle school students. Overall, the perception of school climate was a significant predictor of GPA, with the perception of school as supportive as the key contributing element across gender and ethnicity. They found significant differences between girls and boys and their perceptions of the three dimensions of school climate studied. Compared with girls, boys' perceptions of school climate were more negative. Girls were less likely to find the school to be well-maintained or to find school staff supportive. In addition, boys were more likely to report feeling unsafe at school. Boys were more likely to report a wider range of victimization experiences than girls. The fact that boys experienced the school climate to be less safe and supportive than girls is consistent with the finding that boys were more often the victims of violence and aggression. Compared with girls, boys reported significantly greater experiences of aggression, both physical and verbal. These findings suggest that school climate may be less responsive to the needs of boys. This analysis indicates that boys may be more at-risk when considering perceptions of school climate and academic success. For boys, perception of school climate predicted twice as much variance in GPA than it did for girls. This suggests that school climate is especially important to the academic achievement of male middle school students.

Personal characteristics clearly impact a students' perceptions of school climate and their educational experiences and outcomes. The implication here is that schools should carefully tailor school climate interventions to meet the individual needs of male

and female students of different grade levels/ages and race/ethnicities rather than implementing generic one-size-fits-all interventions.

Summary and Implications of the Literature Review

It is now commonly agreed by organizational theorists that most organizations are open systems which interact with external forces and use them to purposefully achieve their goals (Hoy & Miskel, 2008). The open-systems view of schools puts forth the notion that a series of formal and informal inputs from the environment (personnel, students, families, and resources) are transformed by an organizational process that occurs within the school and can negatively or positively affect student outcomes (Hoy & Miskel, 2008). The view that schools are open systems informs this research in that inputs from the environment are transformed by an organizational process such as a specific school climate improvement intervention with the goal of producing strong student outcomes.

The open-systems perspective of schools has led researchers to more fully examine the nature of the transformational process that occurs within schools in order to identify which characteristics of schools significantly and consistently effect student outcomes. Building on the open-systems perspective of schools, the effective schools movement urges that the school experience should be examined in order to determine how it can best influence student outcomes. Effective schools research is specifically concerned with how internal school variables affect the performance of specific subgroups of students. In this view, "all children are eminently educable and…the

behavior of the school is critical in determining the quality of that education" (Edmonds, 1979, p.20).

Historically, the effective schools movement aimed to show that all children can be educated regardless of background and that there exist specific best practices within K-12 schools that make educating all students possible. The effective schools movement yielded seven effectiveness correlates which are commonly viewed as subsystems that contribute to the transformation that occurs within a school as well as the overall effectiveness of the school. The explanation for their success lies in the nature of the interaction between the school experience and the demographics and academic histories of their students (Lezotte & Snyder, 2011). The correlates of effective schools are also very similar to the organizational components described by Sells (1968) as contributing to the transformation phase of the open-systems model of organizations. The effective schools movement is used as a backdrop for the current study in that the correlates of effective schools are described by Hoy (1990) as constituting a school climate that promotes academic achievement.

As described in the literature review there are multiple definitions of school climate and disagreement amongst researchers as to which specific dimensions constitute school climate. There is however general agreement that school climate is a composite variable made up of many dimensions (Brookover & Erickson, 1975), each affecting student achievement to varying degrees and under different circumstances (Brookover et al., 1978; Chen & Weikart, 2008; Cohen et al., 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil et al., 2009; Pallas, 1988; Ross et al., 2007; Shann,

1999; Sherblom et al., 2006; Sweetland & Hoy, 2000; West, 1985). To date much of the research in this field has treated school climate as a general construct. While interesting, these findings have little value to practitioners and policy makers if the construct of school climate is not broken down and described in terms of the impact of its contributing climate dimensions on student outcomes.

There is evidence that different dimensions of school climate are associated with student achievement, including differentiated associations with different content areas. Using the four school climate dimensions described by the National School Climate Center (NSCC, n.d.), researchers have documented positive relationships with student achievement for each dimension. Relationships between student achievement and safety (Griffith, 1997; Kraft & Marinell, 2016; Kwong & Davis, 2017; Ma & Klinger, 2000), teaching and learning (Gaziel, 1997; Goddard et al., 2000; Hoy & Hannum, 1997; Sweetland & Hoy, 2000), interpersonal relationships (Brand et al., 2008; Buckley et al., 2003; Esposito, 1999; Ruus et.al (2007); Shann, 1999; Sherblom et al., 2006), and institutional environment (Macneil et al., 2009; Reynolds et al., 2017; Ruus et al, 2007) have been found.

Furthermore, there is data showing significant relationships between perceptions of different school climate dimensions and individual-level factors such as race/ethnicity, gender, and grade level/age (Battistich et al., 1995; Koth et al., 2008; Kuperminc et al., 1997; LaSalle et al., 2016; Way et al., 2007; Yates, 2003). Studies have shown that personal characteristics clearly impact a students' perceptions of school climate as well as their educational experiences and outcomes. As a result, these personal factors might be

expected to moderate the relationship between school climate and student achievement. However, most of these studies examined relationships between individual-level factors and perceptions of school climate as a general construct rather than looking at how relationships between different dimensions of school climate might vary across race/ethnicity, gender and grade level/age.

In order for school climate to become a priority in schools, it is important to demonstrate the impact that school climate has on valued outcomes for students, including achievement. Firstly, it is important to understand the relationships that may exist between different dimensions of school climate and student achievement and in particular the relationships that may exist between specific dimensions of school climate and reading and mathematics achievement. It is also important to understand how perceptions of school climate may vary with individual-level factors such as gender, grade level/age, and prior achievement. Finally, it is crucial to understand the interplay between school climate, individual-level factors, and student achievement. This will allow for a more tailored approach to school improvement and a more targeted effort at meeting the individualized needs of all students.

An examination of the relationships between the contributing dimensions of school climate and student achievement in reading and mathematics for students of different gender, age, and prior achievement adds to the body of knowledge about factors impacting student outcomes and could potentially inform school reform efforts. In exploring which school climate dimensions impact which groups of students, policy

makers and school administrators will have detailed information about how to focus and tailor school improvement efforts in the service of improved outcomes for all students.

Chapter III

Methodology

This chapter includes a review of the methodology associated with this study. It begins with an overview of the study, including a description of the purpose of the study, the rationale for the study, and the conceptual framework. The design of the study is then described, including the research questions, a description of the sample, and the measures used in the study. Finally, a description of the two-stage data analysis procedure is given, with a description of the school-level analysis and the student-level analysis. The data analysis includes an examination of the relationship between perceptions of four major school climate dimensions and ten subdimensions of school climate, and reading and mathematics achievement scores for elementary school students of different gender, grade levels, and prior achievement levels.

Overview of the Study

This section provides a detailed overview of the purpose of the study, the rationale for the study as well as a description of the conceptual framework used for this study. ESSA requires that student achievement scores be disaggregated by subgroup to ensure that all groups of students are making progress towards proficiency. This has created the impetus for educators to examine which types of interventions work for which groups of students and to examine how best to differentiate interventions in order to meet the diverse needs of all students. In order for school climate to be considered by states as an important accountability metric to be included in state level ESSA plans, it is

important to demonstrate the impact that different school climate dimensions have on student outcomes. An examination of the relationship between four major school climate dimensions and the ten associated subdimensions and student achievement adds to the body of knowledge about potential factors that influence student outcomes and could potentially inform school reform efforts. The current study seeks to determine the relationship between perceptions of school climate dimensions and reading and mathematics achievement scores for elementary school students of different gender, grade levels, and prior achievement.

Purpose of the Study

Public schools are charged with educating all students regardless of their background. ESSA requires that student achievement scores be disaggregated by subgroup to ensure that all groups of students are making progress towards proficiency. This has created the impetus for educators to examine which types of interventions work for which groups of students and to examine how best to differentiate interventions in order to meet the diverse needs of all students. In addition, ESSA now includes a broader definition of student success beyond test scores to include a nonacademic indicator. ESSA provides specific examples of possible indicators such as school climate and safety, student or educator engagement, access to advanced coursework, and postsecondary readiness. However, specific nonacademic indicators are not mandated nor must selections be made from the aforementioned list.

As described in the literature review, there is evidence that different dimensions of school climate (e.g., safety, teaching and learning, interpersonal relationships, and

institutional environment) are associated with student achievement, including differentiated associations with different content areas (Kraft & Marinell, 2016; Ma & Klinger, 2000; Reynolds et al., 2017; Zamora & Hernandez, 2016). Furthermore, there is data showing significant relationships between perceptions of different school climate dimensions and individual-level factors such as race/ethnicity, gender, and grade level/age (Battistich et al., 1995; Koth et al., 2008; Kuperminc et al., 1997; LaSalle et al., 2016; Way et al., 2007; Yates, 2003). In order for school climate to be considered by states as an important accountability metric to be included in state level ESSA plans, studies must demonstrate the potential effects that different school climate dimensions have on student outcomes.

The purpose of this study is to examine the relationship between perceptions of four major school climate dimensions and ten associated subdimensions, as defined by the NSCC, and reading and mathematics achievement scores for elementary school students of different gender, grade levels, and prior achievement. The study is significant because this quantitative analysis will help practitioners and policy-makers prioritize school improvement efforts based on knowledge about which school climate dimensions impact which subgroups of students. The study also provides guidance for further research about how school climate may influence the educational success of different populations of elementary school students.

Rationale for the Study

School climate is a rich, complex, and malleable variable that has the potential to be utilized to bring about improved student achievement for all students (Brookover et

al., 1978; Chen & Weikart, 2008; Cohen et al., 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil et al., 2009; Pallas, 1988; Ross et al., 2007; Shann, 1999; Sherblom et al., 2006; Sweetland & Hoy, 2000; West, 1985). Some researchers have shown how school climate efforts have brought about differing student outcomes based on gender, race, and grade level, thereby implying that improving student achievement scores cannot be tackled using a "one size fits all" approach (Battistich et al., 1995; Koth et al., 2008; Kuperminc et al., 1997; LaSalle et al., 2016; Way et al., 2007; Yates, 2003). Differentiated efforts are required to meet the varied needs of all students. For this reason, studies should explore the associations between specific dimensions of school climate and outcomes for different populations of students. This will allow for a more tailored approach to school improvement and a more targeted effort at improving student achievement. An examination of the relationship between four major school climate dimensions and ten associated subdimensions and student achievement adds to the body of knowledge about factors impacting student outcomes and could potentially inform school reform efforts and future research.

According to a 2017 50-state policy scan on state school climate policies, the National School Climate Center (Cohen & Rivera-Cash, 2018) determined that 35 states had policies on school climate (up from 27 in 2011). There is ongoing concern, however, that existing school climate policies are not necessarily aligned with current definitions and research. The current study is designed to provide guidance regarding how school climate can be deployed in schools. School-level and student-level climate and achievement data were used to conduct an exploratory quantitative analysis that provides information about which major dimensions of school climate (i.e., safety, teaching and

learning, interpersonal relationships, and institutional environment) and which specific associated school climate subdimensions (rules and norms, sense of physical security, sense of social-emotional security, support for learning, social and civic learning, respect for diversity, social support from adults, social support from students, school connectedness and engagement, and physical surroundings) are related to the achievement outcomes of specific groups of students. Such data has the potential to inform and refine school reform efforts that rely on best practices for school design, programming, leadership, and instructional practices.

By examining the relationship between different school climate dimensions and student achievement scores for different groups of students, information is provided about the potential (and challenges) of using school climate as an accountability measure or school quality indicator for state level ESSA plans. Because school climate improvement could become an integral part of state level accountability plans, implemented at the school level and integrated into classroom practice in the service of improved student outcomes, more information is needed about the relationship between different school climate measures and achievement, especially for different populations of students. While this study does not provide definitive answers about the utility of school climate as an indicator of school quality, it does provide insights into the construct's utility and direction for further research.

Conceptual Framework

It is now commonly agreed by organizational theorists that most organizations are open systems which interact with external forces and use them to purposefully achieve

their goals. The open-systems view of schools puts forth the notion that a series of formal and informal inputs from the environment are transformed by an organizational process that occurs within the school and can negatively or positively affect student outcomes (Hoy & Miskel, 2008). The view that schools are open systems informs this research in that inputs from the environment (e.g., students, personnel, funding, and resources) are transformed by organizational processes with the goal of producing strong student outcomes. The open-systems view of schools presupposes that public schools are responsible for effectively teaching all students and that the means to do so are within the realm of school control regardless of student demographics (Lezotte & Snyder, 2011).

Building on the open-systems perspective of schools, the effective schools movement urges that the school experience should be examined to determine how it can best influence student outcomes. Effective schools research is specifically concerned with how internal school variables affect the performance of specific subgroups of students. This is a foundational tenet of the effective schools movement, which further informs this work. The effective schools movement emphasizes that "all children can learn and that the school controls the factors necessary to ensure student mastery of the core curriculum" (Lezotte & Snyder, 2011, p.1). The effective schools movement is used as a backdrop for the current study in that the correlates of effective schools are described by Hoy (1990) as constituting a school climate that promotes academic achievement.

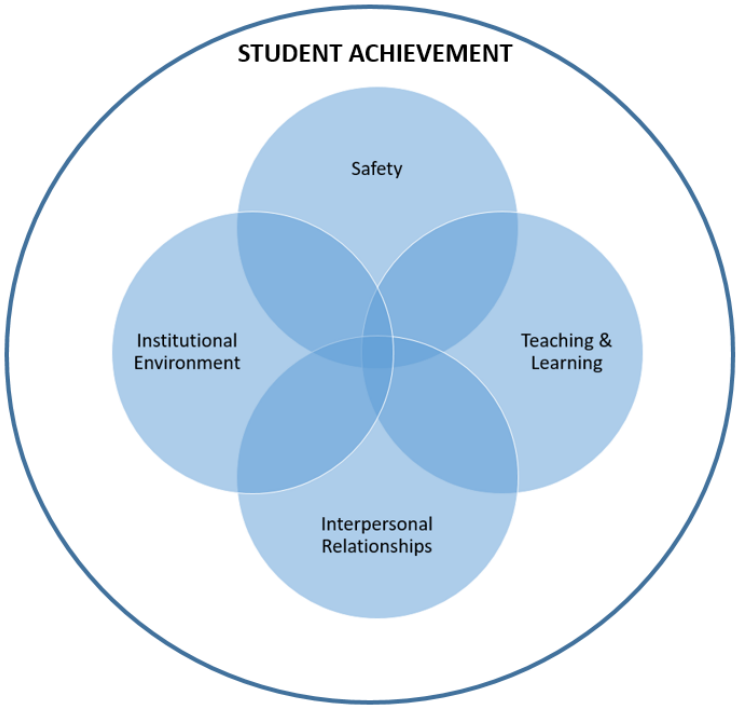
As described in the literature review, there are multiple definitions of school climate and disagreement amongst researchers as to those specific dimensions that comprise school climate. There is however general agreement that school climate is a

composite variable made up of many dimensions (Brookover & Erickson, 1975), each affecting student achievement to varying degrees and under different circumstances (Brookover et al., 1978; Chen & Weikart, 2008; Cohen et al., 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil et al., 2009; Pallas, 1988; Ross et al., 2007; Shann, 1999; Sherblom et al., 2006; Sweetland & Hoy, 2000; West, 1985).

As depicted in figure 3.1, the current study seeks to determine the relationship between perceptions of four major school climate dimensions and reading and mathematics achievement scores. The assumption is made that school climate influences many aspects of student performance but not necessarily equally. School climate may have differential effects on student achievement, as moderated by subject area, student gender, student grade level, or prior achievement. The overlapping areas depicted in figure 3.1 acknowledge that the effects of school climate on achievement may also be shared across dimensions. Understanding the unique and multiple relationships between different school climate dimensions and achievement as depicted in Figure 3.1, is the primary focus of this study.

Figure 3.1

Conceptual Framework



Design of the Study

This section provides an overview of the research questions examined in this study as well as descriptions of the sample, measures, and data analysis procedures. To examine the research questions, a two-stage analysis of data is utilized using school-level data first (between-school analysis) and student-level data second (within-school anlaysis). Measures utilized include measures of school climate, measures of achievement, and individual characteristics.

Research Questions

To examine the research questions, a two-stage analysis of data was used. In the first stage, school-level data from 14 elementary schools representing approximately 1,600 students was used to examine the relationships between the average school climate scores for school safety, teaching and learning, interpersonal relations, and institutional environment and associated subdimensions and average reading and mathematics scores. These relationships were examined for all students, as well as disaggregated by gender and grade. In the second stage of the analysis, student-level data for two samples was used to investigate the relationship between individual student perceptions of the four dimensions of school climate and associated subdimensions and individual student achievement in reading and mathematics. The largest sample, 120 students, was used to examine whether the relationships between achievement and perceptions of school climate dimensions were moderated by gender and grade. Because prior achievement scores were not available for all students, the smaller sample, 72 students, was used to examine whether the relationships between achievement and student perceptions of school climate dimensions were moderated by prior achievement. Using measures of school climate, student achievement, and individual characteristics, a two-stage analysis of data was used to examine the following research questions:

Stage-One Analysis: School-level analysis

1. Do schools with higher average student perceptions on school climate dimensions, as measured by the Comprehensive School Climate Survey

(CSCI), also have higher percentages of students achieving proficiency or better on reading and mathematics state assessments?

2. Is the relationship between average student perceptions of school climate dimensions and the percentages of students achieving proficiency or better on reading and mathematics state assessments the same for male and female students?
3. Is the relationship between average student perceptions of school climate dimensions and the percentages of students achieving proficiency or better on reading and mathematics state assessments the same for 4^{th} and 5^{th} grade students?

Stage-Two Analysis: Student-level analysis

4. Do individual students with more positive perceptions of school climate dimensions also have higher achievement scores in reading and mathematics?
5. Is the relationship between individual student perceptions of school climate dimensions and individual student reading and mathematics scores the same for male and female students?
6. Is the relationship between individual student perceptions of school climate dimensions and individual student reading and mathematics scores the same for 4^{th} and 5^{th} grade students?
7. Is the relationship between individual student perceptions of school climate dimensions and individual student reading and mathematics scores the same for students with higher and lower levels of prior achievement?

Sample Participants

In this study, data was used from two different sources. In the first stage of the analysis school-level data from the 2011-2012 school year representing approximately 1,600 4th and 5th graders from 14 elementary schools located in the District of Columbia, New York, Connecticut, and Pennsylvania was used.

The following procedure was used to select the schools. First, NSCC was contacted and climate data for elementary schools who took the CSCI during the 2011-2012 school year was requested. NSCC provided data for 30 elementary schools. Using this list of schools, publicly available achievement data for the 2011-2012 school year was accessed. The final list of schools used for this study was determined by selecting schools with available climate data for 4th and 5th grade students, as well as publicly available achievement data for those grades that was available in disaggregated form by gender and grade level. This left 14 schools in total.

Table 3.1 provides more detail about each school. Schools range in size, at least as measured by their total 4th and 5th grade enrollments. The largest school has an enrollment 189 4th and 5th grade students, while the smallest school has an enrollment of 67 4th and 5th grade students. With a few exceptions, most schools have roughly equivalent numbers of male and female students, as well as roughly equivalent numbers of 4th and 5th grade students. The largest difference in male and female enrollment is 41% v 59% for school 2; the largest difference in 4th and 5th grade enrollment is 60% v 40% in school 1 and 40% v 60% in school 3. Most schools have moderate to low free

and reduced price meals enrollment (16% - 40%), with the exception of school 14, which has a free and reduced price meals enrollment of 94% and could be considered an outlier

Table 3.1

School Descriptions

School	State	# students in grades 4th & 5th grade	# female students in 4th & 5th grade	# male students in 4th & 5th grade	# students in 4th grade	# students in 5th grade	% Free and Reduced Price Meals
1	PA	189	94	95	114	75	37
2	CT	121	71	50	59	62	35
3	NY	110	54	56	43	66	16
4	CT	84	40	44	44	40	24
5	CT	137	68	69	61	76	30
6	NY	150	78	72	74	76	26
7	NY	130	62	68	68	62	17
8	CT	67	31	36	38	29	30
9	CT	136	64	72	75	61	31
10	CT	114	49	65	59	55	23
11	CT	75	32	43	35	40	40
12	CT	99	47	52	53	46	NA
13	PA	75	37	38	37	38	31
14	DC	72	30	42	38	34	94

In the second stage of the analysis, student-level student climate and reading and mathematics achievement data from school years 2011-2012 and 2012-2013 for 3rd-5th grade students from one elementary school in Washington DC (n = 72; school 14 in table 3.1) was used. For the 2011-2012 school year, data from the 3rd and 4th graders was used as a measure of prior achievement and for the 2012-2013 school year data for these same students who were then 4th and 5th graders was used as a measure of current achievement. As table 3.1 indicates, these students were far more likely to come from low-income family backgrounds than high-income family backgrounds. In the second stage of the

analysis, an additional sample of students (n=120) was used from the 2012-2013 school year from the same elementary school in Washington DC.

There are a few reasons why data from 3rd-5th graders from 2011-2012 and 2012-2013 were used for this study. Starting in 2009, the elementary school studied in the second stage of the analysis made social emotional learning and school climate top priorities in response to stagnating achievement scores for their oldest students (4th and 5th graders). The No Child Left Behind Act of 2001 required schools to make yearly progress towards proficiency standards or face increasingly punitive consequences. The school in stage two of this study consistently did not make Adequate Yearly Progress. One intervention implemented by the leadership team at the school was to focus on measuring and improving school climate in the hope of positively impacting student achievement. Beginning in June of 2009 the school began to administer the Comprehensive School Climate Inventory yearly until 2013. The first administration served to establish a baseline of student and adult perceptions of school climate. Beginning in the 2009-2010 school year specific actions were taken in the school to address school climate issues. Data from the 2011-2012 and 2012-2013 school years was the most recent which is why those years were selected for this study. It was also important to assess the impact of school climate on the oldest students in the school (4th and 5th graders) who would have had the benefit of the maximum number of years of programming.

Measures for the Study

There are three types of measures used in this study: measures of school climate, measures of student achievement, and measures of individual student characteristics. Each of these measures are described here, including relevant instrumentation.

Measures of School Climate

While researchers have developed multiple measures of school climate, this study uses school climate data obtained from The Comprehensive School Climate Inventory (CSCI) for all schools included in the study. Based on the NSCC's model of school climate, the CSCI for students assesses four dimensions: safety, teaching and learning, interpersonal relationships, and institutional environment, each of which are made up of additional subdimensions (see appendix C). These dimensions are very similar to the description of school climate by Wang and Degol (2016) derived from their recent review of 327 articles on school climate.

The Comprehensive School Climate Inventory (CSCI) was developed by the National School Climate Center (NSCC, n.d.) in 2002 following scientifically sound and established protocols that support the development of reliable and valid surveys. The assessment tool was designed to determine how students, parents, and school personnel perceive climate in schools. The CSCI is considered to be one of the top school climate surveys in the field and has been vetted by the National School Climate Council, independent reviewers, and a core group of educators and policy leaders (Clifford, Menon, Gangi, Condon, & Hornung, 2012; Gangi, 2010; Haggerty, Elgin & Woolley, 2010).

In a 2010 study of 102 school climate surveys, the CSCI was one of only three that met the American Psychological Associations criteria for being reliable and valid (Gangi, 2010). In an evaluation of 72 social emotional learning measures and school climate surveys for middle school environments, Haggerty et al. (2010) found that only ten instruments met their criteria for being reliable and valid. The CSCI was one of these ten measures and the only school climate measure that they recommended to educators, policy makers, and researchers. A 2012 review of valid and reliable school climate measures by the American Institutes for Research initially looked at 1000 surveys that could be used to gauge principal performance. This initial large group of surveys was reduced to 125 surveys that were studied in much more detail. Of these, the CSCI was one of 13 school climate surveys that displayed evidence of psychometric rigor (Clifford et al., 2012). The U.S. Department of Education's National Center on Safe Supportive Learning Environments also recognizes the CSCI as a reliable and valid measurement tool (U.S. Department of Education, n.d.). Developed over years of research and field testing, the CSCI is used by thousands of schools, districts, and networks of schools and several State Department of Education (Ohio and Iowa).

As part of ongoing work to validate the CSCI, Guo, Choe, and Higgins-D'Alessandro (2011), conducted a confirmatory factor analyses to examine the construct validity of the CSCI. They were able to determine that the CSCI has good construct validity and demonstrates very good reliability at the factor and total score levels. This indicates that questions are grouped in the way that the NSCC predicted and that similar patterns exist across schools and groups of students.

Olsen, Preston, Algozzine, Algozzine and Cusumano (2018) conducted a review and analysis of selected school climate measures to provide a "selective consumer's guide for school personnel engaged in important levels of decision-making related to monitoring and improving the quality and character of interactions that represent academic and behavior standards in schools" (p.47). Their goal was to provide a practical analysis for school personnel by documenting the characteristics and technical features of selected school climate measures. They began by compiling a comprehensive list of current school climate measures and screening them using the following inclusion and exclusion criteria: the definition of school climate used, availability and accessibility, scoring services offered, scope of respondents, method of assessment, and psychometric properties. First and foremost it was necessary for the school climate definition used in the measure to be comprehensive and to align with the working definition used in the screening process. This alignment ensured that the selected measures assessed the overall climate of a school as opposed to a more narrowly defined construct (ie: bullying); availability referred to whether the measurement was easy to locate online and could be acquired by school personnel in a timely manner; scoring services offered referred to the nature of reporting and the extent to which school personnel had access to results; scope of respondents referred to the stakeholders that the survey was designed for (students, parents, teachers and other education professionals, or community members); method of assessment referred to whether data was collected directly from participants or through observation; psychometric qualities referred to technical adequacy around issues of validity and reliability. After the initial screening, the final analysis included 26 measures. These were assessed to establish specific characteristics of each measure and

to determine which measures were most adequate for school personnel to use in school settings. This analysis identified four school climate measures including the CSCI that most accurately and completely fit the criteria for use in schools, outlined by Olsen et al., (2018).

The elementary school version of the CSCI consists of 70 statements that students are asked to rate using the following Likert Scale:

5 = strongly agree
4 = agree
3 = neither agree nor disagree (neutral)
2 = disagree
1 = strongly disagree.

Examples of the statements that students are asked to rate include "adults who work in my school treat students with respect" and "I feel like I belong at my school". Based on the NSCC's model of school climate, the CSCI assesses student perceptions of four major school climate dimensions. The four school climate dimensions, associated subdimensions, and the number of statements included in the survey for each subdimension are described in the table 3.2.

Table 3.2

Comprehensive School Climate Dimensions

Climate Dimension	Subdimensions	# of Statements
Safety	Rules and Norms	6
	Sense of Physical Security	5
	Sense of Social-Emotional Security	9
Teaching and Learning	Support for Learning	10
	Social and Civic Learning	9
Interpersonal Relationships	Respect for Diversity	4
	Social Support - Adults	8
	Social Support - Students	5
Institutional Environment	School Connectedness/Engagement	8
	Physical Surroundings	6

A variety of demographic questions are also included at the end of the survey.

Measures of Achievement

Data from state-level reading and mathematics assessments for Connecticut, the District of Columbia, New York, and Pennsylvania were used for stage one of the analysis. In this stage of the analysis, the relationship between the four dimensions of school climate and associated subdimensions and the percentage of students from different subgroups who achieved proficiency or higher on the state assessments for reading and mathematics was examined. Table 3.3 describes the subjects and grades assessed in each of the state assessments used for this study.

Table 3.3

State Assessments

State	Name of Assessment	Subjects Assessed	Standards	Grades Assessed
Connecticut	Connecticut Mastery Test (CMT)	Mathematics, reading comprehension, writing, science	Connecticut State Standards	3-8
District of Columbia	District of Columbia Comprehensive Assessment System (DC-CAS)	English language arts, mathematics, science	District of Columbia Standards	3-8
New York	New York State Testing Program	English language arts, mathematics	New York State Standards	3-8
Pennsylvania	Pennsylvania System of School Assessment (PSSA)	English language arts, mathematics, science, technology	Pennsylvania State Standards	3-8

For schools in Connecticut the state-level assessment used in the 2011-2012 school year was the Connecticut Mastery Test (CMT). This test is administered to students in grades 3 through 8. The CMT tests students in mathematics, reading comprehension, writing, and science (Connecticut State Department of Education, n.d.).

For schools in the District of Columbia the assessment used in the 2011-2012 school year was the District of Columbia Comprehensive Assessment System (DC-CAS). The DC-CAS is based on the District of Columbia standards, which define what students should be learning each year. The DC-CAS is a standards-based assessment, which measures specific skills defined for each grade level. DC-CAS results show the level of proficiency a student demonstrates in each of the subject areas tested. These tests are aligned with the approved English language arts, mathematics, and science standards of

the District of Columbia (Office of the State Superintendent of Education, Washington, D.C, n.d.).

For schools in New York, the state-level assessment used in the 2011-2012 school year was the New York State Testing Program for English Language Arts and the New York State Testing Program for Mathematics. These tests are administered to students in grades 3 through 8. The tests are designed to measure how well students are mastering the learning standards that guide classroom instruction and help to ensure that students are on track to graduate from high school with the critical thinking, problem solving, and reasoning skills needed for success in college and the modern workplace (The State Education Department of New York, n.d.).

For schools in Pennsylvania the state-level assessment used in the 2011-2012 school year was the Pennsylvania System of School Assessment (PSSA). The annual Pennsylvania System School Assessment is a standards-based, criterion-referenced assessment which provides students, parents, educators, and citizens with an understanding of student and school performance related to the attainment of proficiency on specific academic standards. These standards in English language arts, mathematics, and science and technology identify what a student should know and be able to do at varying grade levels. School districts possess the freedom to design curriculum and instruction to ensure that students meet or exceed the standards. Every Pennsylvania student in grades 3 through 8 is assessed in English Language Arts and Mathematics (Pennsylvania Department of Education, n.d.).

For stage two of the analysis, achievement data from the District of Columbia Comprehensive Assessment System (DC-CAS) was used**.** The DC-CAS, as mentioned above, is based on the District of Columbia standards, which define what students should be learning each year. The DC-CAS is a standards-based assessment, which measures specific skills defined for each grade level by the District of Columbia. These tests are aligned with the approved English language arts, mathematics, and science standards of the District of Columbia. While for the first stage of the analysis the percentage of students who achieved proficiency or above in the school was examined, in the second stage of the analysis the scale scores on the assessments for individual students was examined.

Measures of Individual Characteristics

Measures of individual characteristics were obtained from publicly available data on gender, grade level, and prior achievement. In each stage of the analysis achievement was disaggregated by gender (male and female) and grade (4^{th} and 5^{th} grade). In the second stage of the analysis a measure of students' prior achievement in reading and mathematics was also examined to consider whether the relationship between school climate and achievement differed for higher and lower achieving students.

Data Analysis Procedures

This study used a two-stage data analysis procedure to examine the research questions. In the first stage or the school-level analysis, the relationship between the average scores for each of the four major school climate dimensions assessed by the

CSCI and the percentage of students achieving proficient or advanced in reading and mathematics on state assessments in each of 14 schools was examined. Whether these relationships differed by gender and grade was also examined. The same process was used to examine the relationship between the average scores for each of the ten subdimensions assessed by the CSCI and the average levels of achievement in each of the 14 schools. In this stage, the first three research questions were addressed using school-level data, descriptive statistics, and bivariate regression. Bivariate regression explores the predictive relationship between two variables, in this case achievement in reading and mathematics as the dependent variable and perceptions of climate across the four major dimensions and ten subdimensions defined by NSCC as the independent variable. The basic regression model can be represented as:

$$Y_j(\text{achievement}) = b_{0j} + b_{1j}(\text{dimension}) + r_j$$

where,

Y_j(achievement) is the percentage of students who achieved proficiency or higher in reading or mathematics in each school,

b_{0j} is the average percentage of students who achieved proficiency or higher in reading or mathematics across schools,

b_{1j}(dimension) is the deviation from the average associated with a unit increase or decrease in the average student perception of one of the four dimensions, and

r_j is the residual or remaining variance in the measure of achievement.

To assess the relationship between student achievement and the four school climate dimensions, a total of 40 bivariate regression models were estimated. First, a bivariate regression model for each of the four major school climate dimensions and reading and mathematics achievement (4 x 2 = 8) were estimated. Then the achievement measures and perceptions of each dimension of school climate were disaggregated by gender and a set of regression models for male and female students separately (4 x 2 x 2 = 16) were re-estimated. Finally, the achievement measures and perceptions of each dimension of school climate were disaggregated by grade and a set of regression models for 4^{th} graders and 5^{th} graders separately (4 x 2 x 2 =16) were re-estimated. Using the results of these analyses, a comparison was made between how well each of the four major dimensions of school climate predicted reading and mathematics achievement for male and female students and 4^{th} and 5^{th} grade students.

To assess the relationship between student achievement and the ten school climate subdimensions, a total of 100 bivariate regression models were estimated. First, a bivariate regression model for each of the ten school climate subdimensions and reading and mathematics achievement (10 x 2 = 20) were estimated. Then the achievement measures and perceptions of each subdimension of school climate were disaggregated by gender and a set of regression models for male and female students separately (10 x 2 x 2 = 40) were estimated. Finally, the achievement measures and perceptions of each subdimension of school climate were disaggregated by grade and a set of regression

models for 4th graders and 5th graders separately (10 x 2 x 2 = 40) were estimated. Using the results of these analyses, a comparison was made between how well each of the ten subdimensions of school climate predicted reading and mathematics achievement for male and female students and 4th and 5th grade students. These analyses provide some insights into the validity of school climate as an indicator of school quality, at least as determined by the achievement levels at the 14 elementary schools included in the sample.

In the second stage of the analysis or the student-level analysis, a more detailed analysis of the association between individual perceptions of school climate as measured by the CSCI and student achievement scores in reading and mathematics was conducted. For this analysis, the school climate and achievement data associated with the elementary school in Washington DC was investigated. Using student-level data, descriptive statistics, and multiple regression, the final four research questions were addressed. The regressions were run using first the four school climate dimensions and then the ten subdimensions assessed by the CSCI. Multiple regression explores the predictive relationship between one outcome variable (in this case achievement in reading or math) and several predictor variables (in this case perceptions of school climate, gender, grade level, and prior achievement). The basic regression model can be represented as:

$$Y_i(\text{achievement}) = b_{0i} + b_{1i}(\text{dimension}) + b_{2i}(\text{gender}) + b_{3i}(\text{gender-dimension interaction}) + r_i$$

where,

Y_i(achievement) is a student's scale score in reading or mathematics,

b_{0i} is the average student scale score in reading or mathematics in the school,

b_{1j}(dimension) is the deviation from the average associated with a unit increase or decrease in a student's perception of one of the four dimensions,

b_{2j}(gender) is the difference between male and female students in their achievement in reading or mathematics,

b_{3j}(interaction) is the difference between male and female students in the relationship between their perceptions of a dimension and achievement in reading or mathematics, and

r_j is the residual or remaining variance in the measure of achievement.

To assess the relationship between student achievement and the four school climate dimensions, a total of 24 multiple regression models were estimated. For example, a model that estimated the relationship between each achievement outcome (reading and mathematics), each dimension of school climate (safety, teaching and learning, interpersonal relationships, and institutional environment), gender, and an interaction term for gender and each dimension (2 x 4) was examined. These models were then re-estimated substituting grade for gender (2 x 4) and prior achievement for grade (2 x 4). To maximize the amount of information that could be derived from each

model, the variables were entered in stages: a) dimension only, b) dimension and potential moderator (e.g., gender, grade, or prior achievement), then c) dimension, potential moderator, and potential moderator by dimension interaction. However, unless stated otherwise, we only report the results for the full model in Chapter 4.

To assess the relationship between student achievement and the ten school climate subdimensions, a total of 60 multiple regression models were estimated. For example, a model that estimated the relationship between each achievement outcome (reading and mathematics), each subdimension of school climate, gender, and an interaction term for gender and each dimension (2 x 10) was examined. These models were then re-estimated substituting grade for gender (2 x 10) and prior achievement for grade (2 x 10). To maximize the amount of information that could be derived from each model, the variables were entered in stages: a) dimension only, b) dimension and potential moderator (e.g., gender, grade, or prior achievement), then c) dimension, potential moderator, and potential moderator by dimension interaction.

One advantage of using multiple regression (as in stage two) over the bivariate regression (as in stage one) is that it provides a direct test of whether the relationship between student perceptions of a dimension and achievement are the same or statistically different for male and female students, 4^{th} and 5^{th} grade students, and students with lower or higher prior achievement. Moreover, while stage one examined the validity of school climate as an indicator of quality at the school level, stage two examined the validity of school climate as an indicator of quality at the individual student level.

Summary

The purpose of this study is to examine the relationship between perceptions of four major school climate dimensions and ten associated subdimensions, as defined by the NSCC, and reading and mathematics achievement scores for elementary school students of different gender, grade levels, and prior achievement. The assumption is made that school climate influences many aspects of student performance but not necessarily equally. School climate may have differential effects on student achievement, as moderated by subject area, student gender, student grade level, or prior achievement.

Using measures of school climate, student achievement, and individual characteristics, a two-stage analysis of data was used to examine the identified research questions. The two-stage analysis of data included a school-level analysis and a student-level analysis. In the first stage of the analysis, the first three research questions were addressed using school-level data, descriptive statistics, and bivariate regression. In the second stage of the analysis the last four research questions were addressed using student-level data, descriptive statistics, and multiple regression. An examination of the relationship between four major school climate dimensions and the ten associated subdimensions and student achievement adds to the body of knowledge about potential factors that influence student outcomes and could potentially inform school reform efforts.

Chapter IV

Results

This chapter begins with a description of the procedures used to prepare the data for analysis. Next, a description of the findings from the two stages of the data analysis is included. First, the results from stage one or the school-level analysis are described and then the results from stage two or the student-level analysis are described. Each of these sections includes a brief overview of the analysis procedures and a description of the findings. This chapter ends with a summary of the findings.

Data Preparation Procedure

Before beginning the analysis the data was prepared in the following way. For both stages of the analysis, the measures were first prepared for the four major dimensions and the ten subdimensions of school climate using students' responses to 70 statements included in the CSCI survey. Because nine statements were worded negatively, they were reverse coded to ensure consistent directionality among the statements. Higher values indicate more positive perceptions of school climate while lower values indicate more negative perceptions of school climate. Using the CSCI description of the dimensions, composite scores were created by averaging the statements associated with the four major dimensions of school climate (safety, teaching and learning, interpersonal relationships, and institutional environment) and the ten subdimensions of school climate (rules and norms, sense of physical security, sense of social-emotional security, support for learning, social and civic learning, respect for

diversity, social support from adults, social support from students, school connectedness and engagement, and physical surroundings).

For the school level analysis, the dimensions of school climate were aggregated to the school level. The school climate dimensions were then centered by subtracting the means from the values for each dimension, making zero the mean across schools for each school climate dimension. The dependent variable for these analyses was the percentage of 4th and 5th graders in the school who achieved proficiency or advanced proficiency on the state assessment. Bivariate regressions were then run by subject area (reading and mathematics) separately for all students, female students, male students, 4th grade students, and 5th grade students. The criterion for statistical significance was set at $p <$ .10 because the n for the school-level analysis was quite low (14). While .10 is higher than the typical .05 criterion for statistical significance, it is a reasonable analytic decision given the exploratory purpose of this study, the small sample size, and the limited statistical power for the analysis.

For the student level of analysis, the school climate dimensions were centered by subtracting the mean from the dimensions, only this time the mean across all students in the school was used. The dependent variable was the standardized scores for students' reading and mathematics assessments (M = 0, SD = 1). The measures of individual characteristics – gender, grade, and prior achievement – were all dummy coded in the following way: for gender 0 = female and 1 = male; for grade 0 = 4th grade and 1 = 5th grade; for prior achievement 0 = basic or below basic and 1 = proficient or advanced. A set of interaction terms was also created between each dummy-coded variable and each

dimension. These variables are the simple product of the dummy-coded variable and the dimension variable. When included in the model, the interaction term estimates whether the relationship between a dimension and achievement scores is the same for each category of the dummy-coded variable (e.g., males v. females). The criterion for statistical significance was set at $p < .05$ because the n for these analyses was 72 or greater.

School-Level Analysis

In the first stage or the school-level analysis, the relationship between the average scores for each of the four major school climate dimensions and associated subdimensions assessed by the CSCI, and the percentage of students achieving proficient or advanced in reading and mathematics on state assessments in each of 14 schools was examined. Whether these relationships differed by gender and grade was also examined. The relationships between achievement and the four major dimensions were examined first, followed by the relationship between achievement and the ten subdimensions. In this stage of the analysis, the first three research questions were addressed using school-level data, descriptive statistics, and bivariate regression. Bivariate regression explores the predictive relationship between two variables, in this case achievement in reading and mathematics as the dependent variable and average perceptions of each school climate dimension as defined by NSCC as the independent variable.

Four Major School Climate Dimensions

The results of the school-level analysis are summarized in table 4.1. The first column identifies the dimension used for the regression. The first block of results reports the findings for reading achievement while the second block of results reports the findings for mathematics achievement. Within each subject area there are five columns (All, Females, Males, 4th grade, and 5th grade). These columns represent the student populations included in the bivariate regression. For each regression the models R squared is reported – the total variance in the dependent variable associated with the independent variable – and the unstandardized b coefficient – the percentage change in the dependent variable associated with a unit increase in the value for one of the dimensions.

All Students

The first column within each block provides the results for the regressions for all students. Of the four school climate dimensions, only "safety" and "interpersonal relationships" had a statistically significant relationship with school achievement levels. Neither "teaching and learning" nor "institutional environment" had a statistically significant relationship with school achievement in any of the regression models for all students. Focusing on the regressions using all students, "safety" and "interpersonal relationships" were positively associated with the percentage of students scoring proficient or higher in mathematics but not in reading. A unit increase in the average perception of "safety" was associated with a 28-percentage point increase in mathematics achievement while a unit increase in the average perception of "interpersonal

relationships" was associated with a 36-percentage point increase in mathematics achievement.

Gender

The next two columns within each block provide results for the regressions for female and male students. None of the dimensions were associated with female reading achievement, but one dimension was found to be statistically significant for female mathematics achievement, "interpersonal relationships". A unit increase in the average perception of "interpersonal relationships" was associated with a 45-percentage point increase in the mathematics achievement of female students. The regression results for male students for "safety" and "interpersonal relationships" indicated that these dimensions were associated with both reading achievement and mathematics achievement. A unit increase in average perception of "safety" was associated with a 30-percentage point increase in reading achievement and a 33-percentage point increase in mathematics achievement for male students. In addition, a unit increase in average perceptions of "interpersonal relationships" was associated with a 40-percentage point increase in reading achievement and a 45-percentage point increase in mathematics achievement.

Grade

The final two columns within each block provide results for the regressions for 4th and 5th grade students. None of the dimensions had a statistically significant relationship with reading achievement or mathematics achievement for 5th grade students. Nor was

there a statistically significant relationship between any of the dimensions and reading achievement for 4th grade students. However, "safety" and "interpersonal relationships" did predict school-level mathematics achievement for 4th graders. A unit increase in the average perception of "safety" was associated with a 29-percentage point increase in mathematics achievement while a unit increase in perceptions of "interpersonal relationships" was associated with a 36-percentage point increase in mathematics achievement for 4th grade students.

Table 4.1

School-Level Regression Analysis: Percentage Proficient or Higher in Reading and Mathematics and Average Perceptions of Four Major Dimensions of School Climate

		READING					MATH				
		All	**Fem**	**Male**	**4th**	**5th**	**All**	**Fem**	**Male**	**4th**	**5th**
Safety	**R squared**	0.04	0.04	0.17~	0.08	0.00	0.16~	0.12	0.16~	0.19~	0.02
	b coeff.	16.63	22.85	30.07~	18.69	6.77	27.71~	32.64	32.89~	28.76~	15.57
Teaching & Learning	**R squared**	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00
	b coeff.	-1.29	-20.31	22.98	7.18	-32.31	15.76	-6.22	31.44	13.14	-20.89
Interpersonal Relationships	**R squared**	0.04	0.12	0.15~	0.05	0.00	0.15~	0.17~	0.15~	0.14~	0.00
	b coeff.	21.96	35.93	40.38~	23.15	3.06	35.96~	44.79~	45.16~	36.22~	11.92
Institutional Environment	**R squared**	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00
	b coeff.	14.11	31.66	28.54	21.39	-11.08	27.25	33.15	28.69	36.67	-1.66

~ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Summary of Analysis

Looking at table 4.1 overall, the results of the bivariate regressions were more similar than dissimilar. Of the 40 regressions reported in the table, only nine (23%) resulted in a statistically significant relationship between one of the four major dimensions and achievement. All of the statistically significant relationships involved the dimensions, "safety" or "interpersonal relationships". Regressions involving male students were more likely to be statistically significant than the regressions involving female students in the table (4 v. 1). Similarly, there were slightly more statistically significant regressions for 4th grade students than 5th grade students (2 v. 0). As for subject area, there were more statistically significant regression models for mathematics achievement than reading achievement (7 v 2).

Ten Subdimensions of School Climate

To explore the first three research questions further, the relationship between the average scores for each of the ten school climate subdimensions as defined by NSCC and the percent of 4th and 5th grade students who achieved proficiency or higher on state assessments in reading and mathematics was examined. Whether these relationships differed by gender and grade was also examined. The data for this school-level analysis is summarized in table 4.2. The table can be read like table 4.1, only in this table there are ten subdimensions as opposed to four major school climate dimensions. Each of the subdimensions is associated with one of the four major school climate dimensions (see appendix C for information about the subdimensions).

All Students

The first column within each block provides results for the regressions for all students. Of the ten subdimensions, only two had a statistically significant relationship with achievement for all students; not surprisingly, each is associated with either "safety" or "interpersonal relationships". One of the subdimensions, "sense of physical security," is associated with "safety" while the other subdimension is "respect for diversity" is associated with "interpersonal relationships". Examining the regression results for all students indicates that "sense of physical security" was associated with only mathematics achievement. A unit increase in the average perception of "sense of physical security" was associated with a 22-percentage point increase in mathematics achievement. "Respect for diversity" was associated with both reading achievement and mathematics achievement. A unit increase in the average perception of "respect for diversity" was associated with a 29-percentage point increase in reading achievement and a 40-percentage point increase in mathematics achievement.

Gender

The next two columns within each block provide results for the regressions for female and male students. One subdimension, "sense of social-emotional security," was found to be statistically significant for female reading achievement, but *negatively* so. A unit increase in the average perception of "sense of social-emotional security" was associated with a 35-percentage point decrease in reading achievement. However, "respect for diversity" was positively associated with both reading and mathematics achievement for female students. A unit increase in the average perception of "respect

for diversity" was associated with a 43-percentage point increase in reading achievement and a 51-percentage point increase in mathematics achievement.

One subdimension, "rules and norms" was found to be statistically significant for male mathematics achievement only. A unit increase in the average perception of "rules and norms" was associated with a 52-percentage point increase in mathematics achievement for male students. "Respect for diversity" was associated with both reading and mathematics achievement for male students. A unit increase in the average perception of "respect for diversity" was associated with a 41-percentage point increase in reading achievement and a 47-percentage point increase in mathematics achievement.

Grade

The final two columns within each block provide results for the regressions for 4th and 5th grade students. None of the ten subdimensions had a statistically significant relationship with reading or mathematics achievement for 5th grade students. One subdimension, "respect for diversity" had a statistically significant relationship with 4th grade reading and mathematics achievement. A unit increase in average perception of "respect for diversity" was associated with a 30-percentage point increase in reading achievement and a 42-percentage point increase in mathematics achievement for 4th grade students. One subdimension, "sense of physical security" had a statistically significant relationship with 4th grade mathematics achievement. A unit increase in average perception of "sense of physical security" was associated with a 21-percentage point increase in mathematics achievement.

Table 4.2

School-Level Regression Analysis: Percentage Proficient or Higher in Reading and Mathematics and Average Perceptions of Ten Subdimensions of School Climate

		READING						MATH				
		All	**Fem**	**Male**	**4th**	**5th**		**All**	**Fem**	**Male**	**4th**	**5th**
Safety												
Rules & norms	R squared	0.00	0.00	0.11	0.00	0.00		0.03	0.00	0.15~	0.05	0.00
	b coeff.	14.70	-11.11	43.13	19.18	-7.93		34.55	-0.79	52.15~	35.65	6.69
Sense of phys. security	R squared	0.10	0.00	0.00	0.11	0.00		0.22~	0.00	0.00	0.20~	0.03
	b coeff.	14.25	4.02	3.67	14.37	8.37		22.05~	8.18	-3.20	20.80~	13.85
Sense of soc.-em. security	R squared	0.01	0.25*	0.00	0.02	0.00		0.10	0.13	0.05	0.10	0.05
	b coeff.	12.36	-35.18*	-13.95	12.90	9.38		20.80	-30.93	-23.88	20.50	15.32
Teaching & Learning												
Support for learning	R squared	0.00	0.05	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
	b coeff.	-16.06	-50.80	11.73	-2.72	-3.38		0.14	-32.53	13.48	-2.26	15.05
Social and civic learning	R squared	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.04	0.00	0.00
	b coeff.	10.79	-17.42	26.95	8.31	-4.26		24.35	-16.88	38.80	14.96	10.03
Interpersonal Relationships												
Respect for diversity	R squared	0.26*	0.26*	0.34*	0.29*	0.04		0.38*	0.30*	0.36*	0.41**	0.12
	b coeff.	28.80*	43.26*	41.31*	30.40*	15.76		40.49*	51.05*	47.07*	41.85**	21.04
Social support – adults	R squared	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.01	0.00	0.00
	b coeff.	6.87	12.17	29.09	7.65	-4.86		23.36	15.87	36.80	19.85	5.36
Social support - students	R squared	0.00	0.01	0.02	0.00	0.00		0.04	0.07	0.00	0.06	0.00
	b coeff.	12.19	19.88	25.13	14.36	-0.59		22.19	28.44	24.49	24.57	10.13
Institutional Environment												
Sch connect. & engagement	R squared	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00	0.00
	b coeff.	7.84	2.35	27.61	-1.73	6.21		27.36	5.82	29.84	18.35	17.72
Physical surroundings	R squared	0.00	0.00	0.00	0.11	0.00		0.00	0.00	0.00	0.13	0.00
	b coeff.	14.01	8.15	1.20	30.55	-0.74		21.99	1.74	-6.26	38.02	9.42

~ $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Summary of Analysis

Looking at table 4.2 overall, only twelve (12%) of the 100 regressions resulted in a statistically significant relationship between one of the ten school climate subdimensions and achievement. All of the statistically significant relationships involved subdimensions associated with the major dimensions of "safety" and "interpersonal relationships". In particular, the subdimension of "respect for diversity" was found to be statistically significant in eight of the ten regressions.

Regarding female and male students, equal numbers of regressions were found to be statistically significant (3 for each), although there were some differences in which subdimensions were found to be significant for male students and which were found to be significant for female students. There were slightly more statistically significant regressions for 4th grade students then for 5th grade students (3 v. 0), and there were slightly more statistically significant regression models for mathematic achievement than for reading achievement (7 v. 5). There was also one unanticipated negative relationship between the percentage of students proficient or advanced and "sense of social-emotional security" for female students.

Student-Level Analysis

In the second stage of the study, the relationship between individual perceptions of school climate dimensions as defined by NSCC and individual achievement in mathematics and reading was examined. For this analysis, the focus was on the school climate and achievement data associated with the elementary school located in Washington

DC. The relationships between achievement and the four major dimensions were examined first, followed by the relationships between achievement and the ten subdimensions of school climate. Two samples were used at this stage of the analysis. Analysis of the first sample (n=120), examined whether the relationship between individual perceptions of school climate and individual achievement differed by gender, grade, and subject area. Analysis of the second sample (n=72), examined whether the relationship between individual perceptions of school climate and individual achievement differed by prior achievement. In this stage of the analysis the last four research questions were addressed using student-level data, descriptive statistics, and multiple regression. Multiple regression explores the predictive relationship between one dependent variable (in this case achievement in reading or mathematics) and several independent variables (in this case perceptions of school climate, gender, grade level, and prior achievement).

Four Major School Climate Dimensions

Tables 4.3 through 4.5 present the results of the analysis for the four major dimensions of school climate. The first block reports the results for reading achievement while the second block reports the results for mathematics achievement. The regression results for each dimension include R squared (the proportion of variance in student achievement associated with the variables in the model), the unstandardized b coefficients for either gender, grade, or prior achievement; the unstandardized b coefficient for one of the dimensions; and the unstandardized b coefficient for the interaction between one of the dimensions and gender, grade or prior achievement. A statistically significant unstandardized b coefficient can be interpreted as the percentage of a standard deviation

(SD) change in the dependent variable associated with a unit change in the independent variable.

Gender

As summarized in table 4.3, of the four school climate dimensions, "safety" was found to be statistically significant for mathematics achievement but not reading achievement. For every unit increase in an individual's perception of "safety," mathematics achievement decreased by .25 of a SD in the full model and by .46 of a SD ($p < .01$) in the model that excluded the non-significant interaction term. None of the other dimensions was statistically significant, with or without the interaction term in the model. Gender was also not statistically significant in any of the models.

Grade

As summarized in table 4.4, and similar to the analysis for gender, "safety" was found to be statistically significant for mathematics achievement but not reading achievement. A unit increase in student-level perceptions of "safety" was associated with a 0.60 SD decrease in mathematics achievement ($p < .01$). In the simplified model, which excluded the interaction term, the decrease was .46 of a SD ($p < .01$). Neither grade nor the interaction term were statistically significant. None of the other dimensions was statistically significant, with or without the interaction term in the model.

Prior Achievement

Table 4.5 presents the results for the analysis with prior achievement. Prior achievement was statistically significant in all of the models for both subjects. Students who scored proficient or better in a subject area at the end of the prior year scored roughly 1.21 SD higher in reading and 1.50 SD higher in mathematics compared to lower achieving students (or students scoring basic or below). Of the four major dimensions, only "interpersonal relationships" had a statistically significant relationship with achievement in mathematics only. A unit increase in individual perceptions of "interpersonal relationships" was associated with a .29 of a SD decrease in mathematics achievement in the full model and a .27 of a SD ($p < .05$) decrease in the model without the interaction term. None of the other dimensions was statistically significant, with or without the interaction term in the model.

Table 4.3
Student-Level Regression Analysis: Reading and Mathematics Achievement by Perceptions of Four Major Dimensions of School Climate and Gender

		READING		MATH
Safety	**R squared**	0.01		0.07*
	b_1 (gender)	-0.13		0.04
	b_2 (dim 1)	-0.11		-0.25[1]
	b_3 (gender x dim 1)	-0.06		-0.32
Teaching & Learning	**R squared**	0.00		0.03
	b_1 (gender)	-0.13		0.07
	b_2 (dim 2)	-0.08		-0.30
	b_3 (gender x dim 2)	0.19		0.06
Interpersonal Relationships	**R squared**	0.01		0.02
	b_1 (gender)	-0.15		0.07
	b_2 (dim 3)	0.05		-0.25
	b_3 (gender x dim 3)	0.10		0.13
Institutional Environment	**R squared**	0.01		0.02
	b_1 (gender)	-0.15		0.06
	b_2 (dim 4)	0.07		-0.28
	b_3 (gender x dim 4)	0.11		0.20

*** $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$**

[1]Statistically significant without b_3, the interaction term, in the model.

Table 4.4

Student-Level Regression Analysis: Reading and Mathematics Achievement and Perceptions of Four Major Dimensions of School Climate by Grade

		READING		MATH
Safety	**R squared**	0.00		0.07*
	b_1 (grade)	0.00		0.00
	b_2 (dim 1)	-0.21		-0.60**
	b_3 (grade x dim 1)	0.12		0.29
Teaching & Learning	**R squared**	0.00		0.03
	b_1 (grade)	0.00		-0.05
	b_2 (dim 2)	0.16		-0.26
	b_3 (grade x dim 2)	-0.28		-0.02
Interpersonal Relationships	**R squared**	0.00		0.02
	b_1 (grade)	0.00		-0.01
	b_2 (dim 3)	0.10		-0.26
	b_3 (grade x dim 3)	0.00		0.17
Institutional Environment	**R squared**	0.00		0.01
	b_1 (grade)	0.03		-0.04
	b_2 (dim 4)	0.13		-0.21
	b_3 (grade x dim 4)	-0.03		0.08

***** p **< 0.05; **** p **< 0.01; ***** p **< 0.001**

Table 4.5

Student-Level Regression Analysis: Reading and Mathematics Achievement and Perceptions of Four Major Dimensions of School Climate by Prior Achievement

		READING		MATH
Safety	**R squared**	0.36***		0.52***
	b_1 (prior ach)	1.22***		1.51***
	b_2 (dim 1)	0.05		-0.19
	b_3 (prior ach x dim 1)	0.00		-0.12
Teaching & Learning	**R squared**	0.37***		0.52***
	b_1 (prior ach)	1.21***		1.47***
	b_2 (dim 2)	-0.21		-0.19
	b_3 (prior ach x dim 2)	0.04		0.06
Interpersonal Relationships	**R squared**	0.37***		0.54***
	b_1 (prior ach)	1.20***		1.47***
	b_2 (dim 3)	-0.25		-0.29[1]
	b_3 (prior ach x dim 3)	0.18		0.06
Institutional Environment	**R squared**	0.36***		0.50***
	b_1 (prior ach)	1.22***		1.50***
	b_2 (dim 4)	-0.14		-0.07
	b_3 (prior ach x dim 4)	0.04		-0.06

***** p **< 0.05; **** p **< 0.01; ***** p **< 0.001**

[1]Statistically significant without b_3, the interaction term, in the model.

Summary of Analysis

Similar to the school-level analysis, only "safety" and "interpersonal relationships" were related to achievement in these regression models. Neither "teaching and learning" nor "institutional environment" were associated with achievement. However, the relationships with individual achievement were negative as opposed to the mostly positive relationships for the school-level analysis. All of the statistically significant relationships were with mathematics achievement. None of the interaction terms were statistically significant, indicating that there were no differences in the relationship between these dimensions and achievement by gender, grade, or prior achievement.

Ten Subdimensions of School Climate

Tables 4.6 through 4.8 present the results of the analysis for the ten subdimensions of school climate. These tables are organized the same way as tables 4.3 through 4.7, only there are ten subdimensions as compared to the four major school climate dimensions. R squared and the unstandardized coefficients for these models can be interpreted the same as the R squared and unstandardized coefficients for the previous models.

Gender

Table 4.6 presents the results for the ten subdimensions. Only the subdimension "sense of social-emotional security" was statistically significant, not surprisingly a component of "safety". However, unlike the previous analysis, a sense of "sense social-emotional security" was associated with both reading and mathematics achievement. A unit increase in student-level perceptions of "sense of social-emotional security" was

associated with a 0.42 SD decrease in reading achievement and a 0.36 SD decrease in mathematics achievement. In the simplified model, excluding the interaction terms, the decrease was .49 SD ($p < .001$) and .55 SD ($p < .001$), respectively. None of the other dimensions was statistically significant, with or without the interaction term in the model.

Grade

Table 4.7 summarizes the results for the analysis by grade. Again, only a "sense of social-emotional security" was associated with achievement. A unit increase in a student's "sense of social-emotional security" was associated with a .53 SD decrease in reading achievement ($p < .01$) and a .64 SD decrease in mathematics achievement ($p < .01$). In models that excluded the interaction terms, the decrease was .48 SD ($p < .001$) in reading achievement and .55 SD ($p < .001$) in mathematics achievement. None of the other dimensions was statistically significant, with or without the interaction term in the model.

Prior Achievement

As summarized in table 4.8, prior achievement was associated with students' achievement scores. The relationship ranges from roughly 1.21 SD for reading to roughly 1.50 SD for mathematics achievement. The only subdimension associated with achievement was "rules and norms," but only for mathematics achievement. A unit increase in a students' perceptions of "rules and norms" was associated with a .19 SD decrease in mathematics achievement, which was statistically significant ($p < .05$) when the interaction term was excluded from the model. None of the other dimensions was statistically significant, with or without the interaction term in the model.

Table 4.6

Student-Level Regression Analysis: Reading and Mathematics Achievement and Perceptions of Ten Subdimensions of School Climate by Gender

		READING		MATH
Safety				
Rules & norms	**R squared**	0.00		0.04
	b_1 (gender)	-0.13		0.05
	b_2 (dim 1)	0.07		-0.18
	b_3 (gender x dim 1)	0.06		0.06
Sense of phys. security	**R squared**	0.00		0.04
	b_1 (gender)	-0.13		0.03
	b_2 (dim 2)	0.03		0.21
	b_3 (gender x dim 2)	0.00		-0.48
Sense of soc-em security	**R squared**	0.10**		0.13**
	b_1 (gender)	-0.15		0.00
	b_2 (dim 3)	-0.42[1]		-0.36[1]
	b_3 (gender x dim 3)	-0.12		-0.33
Teaching & Learning				
Support for learning	**R squared**	0.00		0.04
	b_1 (gender)	-0.12		0.07
	b_2 (dim 4)	-0.06		-0.23
	b_3 (gender x dim 4)	0.02		-0.06
Social and civic learning	**R squared**	0.02		0.03
	b_1 (gender)	-0.14		0.06
	b_2 (dim 5)	-0.09		-0.29
	b_3 (gender x dim 5)	0.29		0.15
Interpersonal Relationships				
Respect for diversity	**R squared**	0.01		0.00
	b_1 (gender)	-0.15		0.05
	b_2 (dim 6)	0.03		-0.09
	b_3 (gender x dim 6)	0.11		0.05
Social support – adults	**R squared**	0.01		0.00
	b_1 (gender)	-0.14		0.04
	b_2 (dim 7)	0.08		-0.13
	b_3 (gender x dim 7)	0.02		0.05
Social support - students	**R squared**	0.00		0.03
	b_1 (gender)	-0.13		0.07
	b_2 (dim 8)	-0.03		-0.30
	b_3 (gender x dim 8)	0.12		0.10
Institutional Environment				
Sch connect. & engagement	**R squared**	0.02		0.01
	b_1 (gender)	-0.14		0.05
	b_2 (dim 9)	-0.03		-0.23
	b_3 (gender x dim 9)	0.30		0.18
Physical surroundings	**R squared**	0.00		0.02
	b_1 (gender)	-0.14		0.06
	b_2 (dim 10)	0.10		-0.20
	b_3 (gender x dim 10)	-0.05		0.13

***** p **< 0.05; **** p **< 0.01; ***** p **< 0.001**

[1]Statistically significant without b_3, the interaction term, in the model.

Table 4.7

Student-Level Regression Analysis: Reading and Mathematics Achievement and Perceptions of Ten Subdimensions of School Climate by Grade

		READING		MATH
Safety				
Rules & norms	**R squared**	0.00		0.04
	b_1 (grade)	0.00		-0.02
	b_2 (dim 1)	-0.02		-0.32
	b_3 (grade x dim 1)	0.10		0.22
Sense of phys. security	**R squared**	0.00		0.02
	b_1 (grade)	0.00		0.00
	b_2 (dim 2)	-0.04		-0.22
	b_3 (grade x dim 2)	0.15		0.25
Sense of soc-em security	**R squared**	0.09**		0.12**
	b_1 (grade)	0.02		0.02
	b_2 (dim 3)	-0.53**		-0.64**
	b_3 (grade x dim 3)	0.08		0.15
Teaching & Learning				
Support for learning	**R squared**	0.00		0.03
	b_1 (grade)	0.00		-0.05
	b_2 (dim 4)	0.06		-0.24
	b_3 (grade x dim 4)	-0.19		-0.04
Social and civic learning	**R squared**	0.01		0.02
	b_1 (grade)	0.01		-0.03
	b_2 (dim 5)	0.20		-0.22
	b_3 (grade x dim 5)	-0.28		0.02
Interpersonal Relationships				
Respect for diversity	**R squared**	0.00		0.00
	b_1 (grade)	0.00		0.00
	b_2 (dim 6)	0.03		-0.14
	b_3 (grade x dim 6)	0.10		0.17
Social support – adults	**R squared**	0.00		0.01
	b_1 (grade)	0.01		-0.01
	b_2 (dim 7)	0.13		-0.18
	b_3 (grade x dim 7)	-0.07		0.16
Social support - students	**R squared**	0.00		0.03
	b_1 (grade)	0.00		-0.04
	b_2 (dim 8)	0.04		-0.21
	b_3 (grade x dim 8)	-0.06		-0.07
Institutional Environment				
Sch connect. & engagement	**R squared**	0.00		0.01
	b_1 (grade)	0.00		0.00
	b_2 (dim 9)	0.14		-0.19
	b_3 (grade x dim 9)	-0.03		0.11
Physical surroundings	**R squared**	0.00		0.01
	b_1 (grade)	0.03		-0.07
	b_2 (dim 10)	0.09		-0.17
	b_3 (grade x dim 10)	-0.04		0.06

***** p **< 0.05; **** p **< 0.01; ***** p **< 0.001**

Table 4.8

Student-Level Regression Analysis: Reading and Mathematics Achievement and Perceptions of Ten Subdimensions of School Climate by Prior Achievement

		READING		MATH
Safety				
Rules & norms	**R squared**	0.36***		0.53***
	b_1 (prior ach)	1.23***		1.50***
	b_2 (dim 1)	-0.05		-0.19[1]
	b_3 (prior ach x dim 1)	0.12		-0.02
Sense of phys. security	**R squared**	0.37***		0.52***
	b_1 (prior ach)	1.17***		1.52***
	b_2 (dim 2)	0.29		0.26
	b_3 (prior ach x dim 2)	-0.24		-0.45
Sense of soc-em security	**R squared**	0.36***		0.52***
	b_1 (prior ach)	1.22***		1.50***
	b_2 (dim 3)	-0.04		-0.31
	b_3 (prior ach x dim 3)	-0.10		0.36
Teaching & Learning				
Support for learning	**R squared**	0.38***		0.52***
	b_1 (prior ach)	1.22***		1.46***
	b_2 (dim 4)	-0.24		-0.26
	b_3 (prior ach x dim 4)	0.09		0.16
Social and civic learning	**R squared**	0.36***		0.51***
	b_1 (prior ach)	1.21***		1.49***
	b_2 (dim 5)	-0.13		-0.10
	b_3 (prior ach x dim 5)	-0.02		-0.02
Interpersonal Relationships				
Respect for diversity	**R squared**	0.38***		0.53***
	b_1 (prior ach)	1.17***		1.46***
	b_2 (dim 6)	-0.18		-0.17
	b_3 (prior ach x dim 6)	0.00		0.00
Social support – adults	**R squared**	0.38***		0.53***
	b_1 (prior ach)	1.22***		1.47***
	b_2 (dim 7)	-0.22		-0.25
	b_3 (prior ach x dim 7)	0.31		0.15
Social support - students	**R squared**	0.36***		0.52***
	b_1 (prior ach)	1.21***		1.52***
	b_2 (dim 8)	-0.10		-0.18
	b_3 (prior ach x dim 8)	0.25		0.21
Institutional Environment				
Sch connect. & engagement	**R squared**	0.38***		0.51***
	b_1 (prior ach)	1.20***		1.50***
	b_2 (dim 9)	-0.18		-0.11
	b_3 (prior ach x dim 9)	-0.03		-0.03
Physical surroundings	**R squared**	0.36***		0.50***
	b_1 (prior ach)	1.22***		1.50***
	b_2 (dim 10)	-0.03		0.00
	b_3 (prior ach x dim 10)	0.09		-0.06

***** p **< 0.05; **** p **< 0.01; ***** p **< 0.001**

[1]Statistically significant without b_3, the interaction term, in the model.

Summary of Analysis

Looking at the student-level regressions for gender, grade, and prior achievement, all of the statistically significant relationships involved the dimension "safety" and more specifically either the subdimension of "sense of social-emotional security" or "rules and norms". However, all of the coefficients for these statistically significant relationships were negative, indicating an inverse relationship between student-level perceptions of school climate dimensions and individual levels of reading and mathematics achievement. Models for mathematics achievement had slightly more statistically significant relationships (3 v. 2) than models for reading achievement. Because none of the interaction terms were statistically significant, there was no indication of differences by gender, grade, or prior achievement in the relationship between the dimensions of school climate and achievement.

Summary

Overall, these regression analyses identified few statistically significant relationships between the dimensions of school climate and achievement, whether the analysis was at the school level or the individual level. However, the two-stage analysis did show some consistencies in the findings. In particular the most consistent school climate dimensions to have a significant association with student achievement in reading and mathematics were "safety," and "interpersonal relationships", and several of their subdimensions. Overall, these dimensions were more frequently predictive of mathematics achievement as opposed to reading achievement, male achievement as opposed to female achievement, and 4^{th} grade achievement as opposed to 5^{th} grade achievement.

However, while school-level associations were mostly positive, the student-level associations were all negative. In other words, when examined at the school level, schools with more positive average perceptions of "safety" or "interpersonal relationships," generally had higher percentages of students achieving proficiency in either reading or mathematics; but when examined at the individual student level, students with more positive perceptions of these same dimensions, had lower achievement scores in either reading or mathematics achievement. These findings are discussed in the next chapter.

Chapter V

Discussion

The national emphasis on student achievement has resulted in much research aimed at identifying educational interventions that promote enhanced student outcomes. School climate is an underexplored and often overlooked variable that has been shown to improve student achievement (Brookover, Schweitzer, Schneider, Beady, Flood, & Wisenbaker, 1978; Chen & Weikart, 2008; Cohen, McCabe, Michelli, & Pickeral, 2009; Gottfredson & Gottfredson, 1989; Johnson & Stevens, 2006; Macneil, Prater & Busch, 2009; Pallas, 1988; Ross, McDonald, Alberg, & McSparrin-Gallagher, 2007; Shann, 1999; Sherblom, Marshall, & Sherblom, 2006; Sweetland & Hoy, 2000; West, 1985). Because school climate is a malleable construct that can be influenced by specific school policies and practices (Deal & Kennedy, 1982; Firestone & Louis, 1999; Freiberg, 1998; Hoy & Miskel, 2008; Saphier & King, 1985; Schein, 2010; Shann, 1999), it is ideally suited to be studied as an independent variable. This study examines the relationship between various dimensions of school climate and student achievement.

The purpose of this study is to examine the relationship between perceptions of different school climate dimensions and reading and mathematics achievement scores for elementary school students of different gender, grade level, and prior achievement. This chapter begins with a detailed discussion of the findings as they relate to each of the seven research questions posed in Chapter 3. Practical implications of the findings are then discussed, particularly whether school climate can serve as a credible indicator of school quality to be considered for inclusion in state ESSA plans. Following the discussion of the

findings and implications, directions for future research, and limitations of the study are reviewed. This chapter closes with a summary.

Review of Findings

Using measures of school climate, student achievement, and individual characteristics, a two-stage analysis of data was used to address seven research questions. A school-level analysis was conducted first followed by a student-level analysis. The findings of this study are discussed below as they relate to each of the seven research questions.

School-level Analysis

Research question #1: Do schools with higher average student perceptions on school climate dimensions, as measured by the Comprehensive School Climate Survey (CSCI), also have higher percentages of students achieving proficiency or better on reading and mathematics state assessments?

The findings for research question #1 indicate that schools with higher percentages of students achieving proficiency in reading and mathematics also have higher average student perceptions of some school climate dimensions but not all. About one quarter of the regression models examined in the school-level analysis were positively and significantly correlated with the percentage of students who achieved proficiency or advanced proficiency on the state assessments, most often the percentage of students who scored proficient or higher on the mathematics assessments. Average perceptions of "safety" and "interpersonal relationships" were the two dimensions most commonly

associated with school-level achievement; there was no relationship between achievement and "teaching and learning" or "institutional environment".

While this study identified fewer statistically significant associations between average perceptions of school climate and average achievement than anticipated, those findings that were significant are consistent with some aspects of the literature on school climate. First, studies report that school climate measures have different associations with different subject areas and, second, dimensions of school climate that include aspects of "safety" and "interpersonal relationships" tend to be more reliably correlated with achievement than other dimensions.

Zamora and Hernandez (2016) studied the associations of school climate or, what they refer to as organizational health (OH), with student achievement in a high needs district. Their study is similar to this one in that they too found that different dimensions of their school climate measure had different associations with different subject areas. They found that the strongest relationships between reading achievement and the ten OH dimensions existed with morale, resource utilization, and goal focus and the strongest relationships between mathematics achievement and the ten OH dimensions existed with morale, autonomy, and goal focus. While comparing study results that use different measures of school climate can be problematic, Zamora's and Hernandez's results suggest that various school climate dimensions within a single study can have differential associations with student achievement, including different subjects.

The current study found that only two of the four major dimensions of school climate predicted achievement, and most often mathematics achievement. "Safety" and

"interpersonal relationships" were positively related to mathematics achievement for all students but not reading achievement for the same group of students. In addition, one of the three school climate subdimensions ("sense of physical security"), which is associated with the major climate dimension of "safety," was positively related to mathematics scores only. This is consistent with studies that have shown that the dimension of "safety" is positively related to achievement and in particular to mathematics achievement. Ma and Klinger (2000) found that of the three climate dimensions that they studied (disciplinary climate, academic press, and parental involvement) the relationship between disciplinary climate and student achievement was significant for mathematics, science, and writing but not for reading. Their definition of disciplinary climate included rules and consequences, student behavior, and how students treated one another, similar to the "safety" dimension included in the CSCI survey. Moreover, Kraft and Marinell (2016) found that improvements in school safety and order corresponded to improvements in student's mathematics achievement but not English Language Arts. In addition, Kwong and Davis (2017) found that safety was related to mathematics achievement but not reading achievement. Consistent with the literature, the current study suggests that the school climate dimension of "safety" tends to have positive significant relationships with mathematics achievement but less so with reading achievement.

The current study also found that "respect for diversity," one of the subdimensions of "interpersonal relationships," was positively associated with the percentage of students scoring proficient or higher in reading and mathematics. This is consistent with the literature that shows that school climate measures that include aspects of "interpersonal relationships" have positive associations with achievement. Shann (1999) found that

positive perceptions of teacher caring and commitment corresponded to higher rates of academic achievement. She further found that the highest achieving school in her study combined an emphasis on academics with a culture of caring. She postulated that school climate based on a culture of caring may actually be a necessary condition for maximum school achievement.

A similar relationship was found in other studies. Sherblom et al. (2006) examined the relationship between school climate dimensions and 3rd and 4th grade mathematics and reading scores on standardized tests. They found that the school climate elements of students' perceptions of the classroom community, their sense of wellbeing, and their concern for others (which is similar to the major school climate dimension of "interpersonal relationships" on the CSCI) were strongly related to mathematics and reading proficiency.

Hoy and Hannum (1997) found that teacher affiliation or the extent to which teachers showed their commitment to their students and their peers made significant contributions to academic achievement. Brand et al. (2008) found that positive peer relationships were found to be related to students' performance on reading and mathematics tests. Stewart (2008) studied the influence of individual-level and school structural variables on student achievement in a sample of 10th grade students from the National Educational Longitudinal study database. The findings from their study showed that student reports of positive peer relationships were significantly associated with student achievement. Consistent with the literature, the current study suggests that the school climate dimension of "interpersonal relationships" shows positive associations with a school's reading and mathematics achievement.

Research question #2: Is the relationship between average student perceptions of school climate dimensions and the percentages of students achieving proficiency or better on reading and mathematics state assessments the same for male and female students?

The findings for research question #2 indicate that the relationship between average student perceptions of school climate dimensions and the percentages of students achieving proficiency or better on reading and mathematics state assessments is different for male and female students, but only for some dimensions of school climate. The major school climate dimension of "safety" was positively associated with reading *and* mathematics achievement for male students but not female students. "Rules and norms," a subdimension of "safety" was also associated with mathematics achievement for male students, and a second subdimension of "safety," "sense of social-emotional support" was negatively associated with reading achievement, but only for female students. The major school climate dimension of "interpersonal relationships" was positively related to reading and mathematics achievement for male students but only mathematics achievement for female students, while "respect for diversity," a subdimension of "interpersonal relationships," was associated with mathematics and reading achievement for both male and female students.

Much of the literature exploring the relationship between perceptions of school climate and achievement fails to examine in much detail how that relationship might vary as a function of gender. Nonetheless, this study's results are consistent with what Buckley et al. (2003) found in their study of school climate and student achievement for male and female students. They studied the possible influence of school climate on achievement for middle school students. Their measures of school climate included perceptions of a) whether the school was safe, b) whether the school was supportive of students, and c) whether the school was kept up. These three dimensions correspond roughly to the major

school climate dimensions of "safety," "interpersonal relationships," and "institutional environment" used in the CSCI survey.

In their study, perceptions of school climate were a significant predictor of GPA, with the perception of school as supportive being the key contributing element across gender and ethnicity. In addition, Buckley and colleagues found significant differences between male and female students in their perceptions of the three dimensions of school climate studied. Female students were somewhat more positive about the school's climate than male students, though female students were somewhat less likely to describe the school to be well-maintained or to find school staff supportive. Larger gender differences were associated with feelings of safety. Male students were more likely than female students to report feeling unsafe at school. Male students also reported a wider range of victimization experiences than female students. Perceptions of the school's upkeep and support of students were positively related to male students' GPAs while only school support of students was positively related to female student's GPAs. Consistent with the literature, the current study suggests that the relationships between perceptions of school climate and student achievement may vary as a function of student gender.

Research question #3: Is the relationship between average student perceptions of school climate dimensions and the percentages of students achieving proficiency or better on reading and mathematics state assessments the same for 4th and 5th grade students?

The findings for research question #3 indicate that the relationship between average student perceptions of school climate dimensions and the percentages of students achieving proficiency or better on reading and mathematics state assessments is different for 4th and 5th grade students, but only for some dimensions of school climate. In particular, two out

of the four major school climate dimensions reviewed, "safety" and "interpersonal relationships," were positively related to mathematics achievement but not reading achievement for 4th grade students but were not related to 5th grade achievement for either reading or mathematics. In addition, two of the ten school climate subdimensions, "sense of physical security," a subdimension of "safety," and "respect for diversity," a subdimension of "interpersonal relationships," were positively associated with achievement for 4th grade students but not for 5th grade students. "Sense of physical security" was associated with mathematics achievement while "respect for diversity" was associated with achievement in reading and mathematics.

Much of the literature exploring the relationship between perceptions of school climate and achievement fails to examine in much detail how that relationship might vary as a function of grade. The literature review shows conflicting evidence regarding the relationship between school climate and achievement for students in different grades. Shindler et al. (2016) found that perceptions of school climate became more negative as students moved from the elementary to secondary school level and that achievement remained highly correlated to overall mean school climate. LaSalle et al. (2016) found that 4th grade students reported higher perceptions of school climate than 5th grade students, but that there was no significant interaction effect between student achievement and grade level.

In the current study no dimension of school climate predicted reading achievement or mathematics achievement for 5th graders. Associated literature shows that perceptions of school climate vary with grade level and that younger students tend to view school climate more positively. In this study, perceptions of school climate were statistically significant for 4th grade students but not for 5th grade students. Two major dimensions and

two subdimensions predicted reading achievement, mathematics achievement, or both for 4th graders. These findings suggest that the relationship between students' perceptions of specific dimensions of school climate and average school achievement may vary as a function of grade.

Student-level analysis

Research question #4: Do individual students with more positive perceptions of school climate dimensions also have higher achievement scores in reading and mathematics?

The findings for research question #4 indicate that there is no positive relationship between individual student perceptions of school climate dimensions and individual reading and mathematics achievement. For those school climate dimensions that do show a statistically significant relationship, the association is negative.

While the negative associations found in this study are surprising, there is some evidence in the literature that some school climate dimensions are in fact negatively associated with student achievement. Yates (2003) found that "satisfaction," as defined as a subdimension of "relationships," was negatively related to educational progress. In her study, Yates showed that the subdimension of "satisfaction" was influenced by students' perceptions of friction between them and by the difficulty of their schoolwork. Both of these relationships were found to be negative, suggesting that students who reported higher levels of interpersonal conflict were less satisfied with school life as were those who perceived their schoolwork to be more difficult, both of which had a negative influence on achievement.

Shann (1999) in her analysis of four urban middle schools, found that the school with the lowest academic achievement scored equally to the higher achieving schools on the prosocial measure of "helping others". Based on interviews with school personnel her rationale for this finding was that many students in this low-achieving school had many unmet human needs that had to be satisfied before full attention could be given to academics. Teachers and administrators placed a greater priority on support services for their students whereas teachers in the higher achieving schools emphasized academics more heavily. The low achieving school in her study is similar to the school used in stage two of the current study and the rationale applied here may be a relevant explanation as to why there were negative associations found in the student-level analyses in stage two. Findings from the current study and others suggest that there may be a negative relationship between perceptions of some school climate dimensions and student achievement.

Consistent with the findings of stage two of the current study and contrary to the large body of literature describing significant relationships between school climate and student achievement, there is some evidence in the literature that some school climate dimensions actually have no significant relationship with student achievement in reading or mathematics. Stewart (2008) found that one of the school climate dimensions that she studied, "student involvement in school," did not have a relationship with student achievement as she had hypothesized. In explaining this nonsignificant finding, she postulated that student's participation in extracurricular activities diverted time and energy away from valuable academic time or activities designed to increase student achievement.

She further explained that because there are different types of extracurricular activities, students may gain advantages from participation in some but not all activities.

Similar findings are described by Reynolds et al., (2017) who studied the impact of school climate and social belonging (connectedness, identification) on student achievement. They found that school climate was not significantly correlated with academic achievement. They then investigated possible indirect effects via a mediator variable. It was the case that school identification showed a significant mediated relationship with numeracy and writing but not for reading and that there was a strong intercorrelation between school climate and school identification. For numeracy and writing, results indicated that school climate significantly predicted achievement through school identification. This study was based on a theoretical framework that viewed school climate and school identification as being related but separate conceptual constructs. Although this may have provided conceptual clarity, this strategy may have weakened the association between the school climate measure used in the research and academic achievement.

Despite the significant body of literature indicating that there is a positive relationship between perceptions of school climate dimensions and student achievement, stage two of this study (the student-level analysis) does not provide similar evidence. The lack of substantial significant results for this research question as well as the presence of some negative associations between school climate dimensions and student achievement suggests that within schools, perceptions of school climate do not affect student achievement positively as anticipated.

Research question #5: Is the relationship between individual student perceptions of school climate dimensions and individual student reading and mathematics scores the same for male and female students?

The findings for research question #5 indicate that there is no positive relationship between individual student perceptions of school climate dimensions and individual reading and mathematics achievement for students of different gender. For those school climate dimensions that do show a statistically significant relationship, the association is negative. In particular, there was a statistically significant negative linear relationship between "safety" and mathematics achievement only. In addition, there was a statistically significant negative linear relationship between the subdimension of "sense of social-emotional security" and both reading and mathematics achievement.

While surprising, there is some evidence in the literature that perceptions of school climate by students of different gender are sometimes negatively related to achievement in reading and mathematics. LaSalle et al. (2016) found that contrary to their expectations there was a negative relationship between school performance and perceptions of school climate by students of different gender. Specifically, as performance increased, perceptions of school climate decreased for both groups and more so for males. They explained these findings by considering additional variables that could have had a negative impact on males' perceptions of school climate when academic performance increased. Examples of variables that they cite that might have a positive or protective effect include positive teacher-student interactions, support, sense of connectedness and belonging, and attitudes about their teacher. Variables that they cite that might have a negative effect include peer victimization and negative perceptions about academics. They also found no

significant interactions between school climate, school performance, and grade level. Kuperminc et al., (1997) used both student and teacher reports of externalizing and internalizing problems. They found that student grades were uncorrelated with school climate perceptions for both male and female students.

The lack of substantial significant results for this research question as well as the presence of some negative associations between school climate dimensions and student achievement for students of different genders suggests that within schools, perceptions of school climate does not affect student achievement positively as anticipated.

Research question #6: Is the relationship between individual student perceptions of school climate dimensions and individual student reading and mathematics scores the same for 4th and 5th grade students?

The findings for research question #6 indicate that there is no positive relationship between individual student perceptions of school climate dimensions and individual reading and mathematics achievement for students in different grade levels. For those school climate dimensions that do show a statistically significant relationship, the association is negative. In particular, there was a statistically significant negative linear relationship between "safety" and mathematics achievement. In addition, there was a statistically significant negative linear relationship between the subdimension of "sense of social-emotional security" and both reading and mathematics achievement.

While surprising, there is some evidence in the literature that perceptions of school climate by students of different grade levels is not related to student achievement. LaSalle et al. (2016) found no significant interactions between school climate, school performance,

and grade level. The lack of substantial significant results for this research question as well as the presence of some negative associations between school climate dimensions and student achievement for students of different grades suggests that within schools, perceptions of school climate does not affect student achievement positively as anticipated.

Research question #7: Is the relationship between individual student perceptions of school climate dimensions and individual student reading and mathematics scores the same for students with higher and lower levels of prior achievement?

The findings for research question #7 indicate that there is no positive relationship between individual student perceptions of school climate dimensions and individual reading and mathematics achievement for students with different levels of prior achievement. Only one major school climate dimension, "interpersonal relationships" and one subdimension of "safety", "rules and norms," had statistically significant relationships with achievement in mathematics, and these were negative associations.

Goddard et al. (2000) included prior achievement in their within-school model in addition to other demographic variables such as race and ethnicity, gender, and SES. Similar to these results, they found prior achievement to have a positive association with achievement. Students with higher levels of prior achievement also had higher levels of current achievement. Unlike the findings in the current study however, their results showed one aspect of school climate, academic emphasis, to be a positive predictor of reading and mathematics achievement. The most similar dimension within the CSCI survey would be, "teaching and learning," which showed no statistically significant relationships with either reading or mathematics achievement.

The lack of substantial significant results for this research question as well as the presence of some negative associations between school climate dimensions and student achievement for students of different prior achievement suggests that within schools, perceptions of school climate does not affect student achievement positively as anticipated.

Implications

Educators are tasked with educating all students. While some factors such as socioeconomic background, demographics, family structure, and learning ability are beyond the control of educators, there are additional factors that contribute to student achievement that educators can focus on. There is a large body of literature that indicates that school climate is a malleable construct that can be utilized to target the individualized needs of specific groups of students. However, this study shows a low number of statistically significant positive results at both the school level and the student level of analysis, suggesting that these results should be considered with caution.

Nonetheless, at the school level some dimensions of school climate were positively and significantly correlated with the percentage of students who achieved proficiency or advanced proficiency on state assessments. In particular and consistent with the literature, most often this correlation existed between perceptions of school climate and mathematics achievement. Further analysis suggested that the two major school climate dimensions most commonly associated with achievement at the school level were “safety” and “interpersonal relationships”. In addition, several of the subdimensions associated with these two major school climate dimensions were also positively and significantly correlated with student achievement.

Results at the student level were less promising because all relationships that were statistically significant were found to be negative. This would indicate that improvements in school climate dimensions may in fact negatively relate to student achievement, though such an interpretation is largely, though not consistently, counter to most of the literature. Nonetheless, one compelling explanation is that in high-poverty schools (such as the school studied in stage two of the analysis), many resources that would otherwise be used to focus on academics were needed to address the many social needs of the student population. This may have led to perceptions of climate to have a negative association with academic achievement. While the results of the student-level analysis may be particular to the school that was studied, the findings of the student-level analysis do not support the use of school climate as a quality indicator.

When considering these findings, policy makers and practitioners should consider the nuances of which climate dimensions have positive relationships with achievement for which groups of students and for which subjects. There are important differences that provide granular information about which climate dimensions to target if the goal is to improve student achievement. The results of this study suggest that policy makers and practitioners should focus their efforts on improving school climate in the two major school climate areas of "safety" and "interpersonal relationships" in order to gain the most out of this type of initiative. However based on the findings from this study, these efforts are more likely to influence achievement in mathematics than reading, the achievement of male rather than female students, and the achievement of 4^{th} graders rather than 5^{th} grade students.

Directions for Future Research

While this study begins to provide some information about which dimensions of school climate are related to the reading and mathematics achievement of male and female students in different grades and with different prior achievement, it also points to important directions for future research. Further investigation as described below will help practitioners and policy makers strategically prioritize school climate improvement efforts and more fully assess its reliability as an indicator of school quality.

In future studies, researchers might consider expanding the geographic scope of the research to include schools from additional states. This would provide a more representative sample. In addition it would allow for a comparison of rural, suburban, and urban schools to identify whether school climate effects schools in different contexts, differently. Very little research has been done about the role of school climate outside of urban and suburban schools.

Additional studies could also include a broader scope of grades beyond 4th and 5th grade. This would allow for a more thorough comparison of the role of school climate in elementary, middle, and high schools. While research has examined differences in the relationship between school climate and achievement for specific grades, there has yet to be a systematic study of whether school climate effects students differently across the full spectrum of grades. Such research should also explore the mechanisms that play a role in any differential influences identified.

Another area of future research could include an examination of the relationship between school climate and other content areas such as science and social studies. While

there have been a few studies that have examined subject areas such as science, most studies have focused on reading or mathematics achievement. As with grade structure, studies should explore the reasons why school climate might have differential influences by subject area. Although the literature provides evidence that school climate is more strongly associated with mathematics than reading, studies do not explore why or rule out the possibility that such findings are spurious.

Future studies could also examine the relationship between school climate and achievement in high poverty and low poverty schools. Studies that demonstrate that school climate is a reliable indicator of school quality could provide granular information about how to prioritize improvement efforts in different environmental contexts. It is possible that the relationship between school climate and achievement are quite different in affluent schools as compared to high-poverty schools. Once again, if differences are identified, researchers should seek to understand why differences exist.

Another area for study includes why specific school climate dimensions or subdimensions are associated with student achievement while others are not. It is important to better understand why dimensions such as "safety" and "interpersonal relationships" are associated with achievement while "teaching and learning" and "institutional environment" are not. An additional consideration is whether and how different dimensions of school climate are related to one another and how they may work together or against one another to influence student achievement.

One last area of future research to consider is investigating the use of different school climate assessments. This begs the question of how to define school climate.

Further investigation of how to actually define and measure school climate is warranted. Regarding the use of the CSCI in the current study, the small number of significant and positive relationships found in the current study may indicate fundamental flaws in the CSCI conceptual model of school climate, particular items on the CSCI survey meant to tap dimensions of the conceptual model, or both. In addition, the CSCI is comprised of 70 statements which is a comparatively long survey to administer to elementary age students. Nonetheless, the CSCI has been validated by several researchers and is considered a rigorous measure of school climate. Additional studies should consider alternative conceptual models and surveys of school climate to further understanding about this aspect of schools.

Limitations of the Study

While this study begins to provide some information about which dimensions of school climate are related to the reading and mathematics achievement of male and female students in different grades and with different prior achievement, it has some obvious limitations. These limitations should be kept in mind when reviewing the results of this study and considering whether school climate would be a good indicator of school quality to include in state-level ESSA plans.

First, the size of the sample, both for the school-level analysis and the student-level analysis is a limitation of this study. In the first stage of the analysis, 14 schools from three states and the District of Columbia were included in the sample. Although these schools included data from approximately 1,600 students, the analysis was done at the school level, resulting in very weak statistical power. The relatively small number of

statistically significant relationships identified for these analyses, even with a criterion of $p < .10$, may have been due to the extremely small sample size used in the analysis.

In the second stage of the analysis, 120 students were in the first sample (the analyses that included gender and grade) and 72 students were in the second sample (the analyses that included prior achievement). Although these sample sizes were larger than those for the first stage of the analysis, they are still relatively small, especially compared to the majority of studies in in the literature review. As with the first stage of the analysis, these sample sizes limited the type of analyses that could be conducted, restricting analyses to a series of bivariate regression models at the school level and somewhat limited multiple regression models at the individual level.

Although some of the results reported for this study are consistent with the results reported by other studies, providing some support for reliability, there were also many inconsistencies with the literature. These inconsistencies, particularly those associated with non-significance could be the result of small sample sizes. If the study had been conducted with larger samples, the results might have included more statistically significant relationships between the dimensions of school climate and student achievement.

A second limitation is that the data used in the analysis is relatively outdated (2011-2013) and does not account for changes in educational reforms that have occurred since that time. For example, the data for this study was collected while states were operating under the policies and practices associated with No Child Left Behind Act (NCLB), but currently states are implementing policies and practices associated with the Every Student

Succeeds Act (ESSA). Many states have also dramatically changed their proficiency assessments, adopting standards and assessment protocols associated with the Common Core standards. The results of this study may lack generalizability – that is, the results of the study may not be fully generalizable to schools operating under updated state policies and practices.

A third limitation, particularly for the school-level analysis, is that the study examined schools from three different states and the District of Columbia, each of which utilized different state assessments to measure reading and mathematics achievement. Although descriptions of the assessments indicated that they might be comparable (ie: each was a criterion-based assessment), they are still not identical, with unknown differences in the structure of the assessments and underlying standards. Using the percent of students who achieved proficiency or higher created a common scale for reading and mathematics achievement across the 14 schools examined in the school-level analysis, but it did not eliminate possible differences in state assessments that may have confounded the results.

A fourth limitation of the study is that the samples were not randomly selected. At the school level, the 14 schools included in the study self-selected to purchase the CSCI and to use it as their school climate assessment tool. While the sample of schools included one school with high proportion of students who qualified for free and reduced-price meals (94%), the majority of schools were more economically advantaged (an average of 28%). The elementary schools in the first stage of the analysis were not fully representative of elementary schools nationally. The school utilized in the second stage of the data analysis also was not randomly selected. It was used because it was the school where I was

employed when I became interested in the topic of school climate and its possible role as a quality indicator for school improvement. The school used in the student-level analysis had a high proportion of students who qualified for free and reduced-priced meals, so the generalizability of the results in the second stage of the analysis is limited, at best, to high-poverty elementary schools located in urban settings.

A fifth limitation is that the data used in the study relied on only student perceptions of school climate. While many studies rely on student perceptions, some studies also include the perceptions of administrators, teachers, and parents. Additional data sources might have resulted in more robust findings. A more thorough assessment of school climate, including multiple perspectives, would have also allowed for the triangulation of perceptions between students, staff, and parents.

A sixth limitation is that due to the large number of regression models examined in this study, there is the possibility that those that were statistically significant occurred by chance. However the number and consistency of significant results exceeded the amount that you would typically expect to find by chance.

A seventh limitation is the simplicity of the regression models used in this study. Because of the small data sets used in this study, we were unable to include multiple control variables as would have been preferable.

An eighth limitation of the study is the fact that as compared to the schools studied in stage one of the analysis the school studied in stage two of the analysis has a high

percentage of free and reduced price meals enrollment (94%), and could be considered an outlier.

Despite these limitations, the purpose of this study was to determine the relationship between school climate and student achievement and to determine which particular school climate dimensions had a statistically significant relationship with reading and mathematics scores for students of different gender, grade levels, and prior achievement. The results of this study, while not conclusive, have implications for future research. This study also raises important questions for educators and policy makers about the reliability of school climate as an indicator of school quality, particularly if raising student achievement is the goal.

Summary

Overall, this study identified few statistically significant relationships between the different dimensions of school climate and student achievement, whether the analysis was at the school level or the individual level. However, the two-stage analysis did show some consistencies in the findings. In particular the most consistent school climate dimensions to have a statistically significant association with student achievement in reading and mathematics were "safety," and "interpersonal relationships," and several of their subdimensions. Overall, these dimensions were more frequently predictive of mathematics achievement as opposed to reading achievement, male achievement as opposed to female achievement, and 4th grade achievement as opposed to 5th grade achievement. While the findings of this study are limited at best, those significant results that were found are consistent with the literature that suggests that aspects of "safety" and "interpersonal

relationships" are positively and statistically associated with the achievement of some students, especially mathematics achievement.

Despite a surprising lack of findings as well as some unanticipated negative associations, directions for further research emerge clearly from this work. Investigation of larger samples of students from a broader range of schools is one clear way to expand the findings and further explore school climate as a quality indicator of schools. Continued study of the relationship between dimensions of school climate and student achievement could help solidify the literature regarding the efficacy of school climate as an adequate measure of school quality as it relates to student outcomes such as achievement in reading and mathematics.

While this study begins to provide some information about which dimensions of school climate are related to the reading and mathematics achievement of male and female students in different grades and with different levels of prior achievement, it has some limitations to review when considering the findings. Nonetheless, the results of this study suggest that the use of school climate as a quality indicator to be included in state level ESSA plans should be considered with caution. Despite the literature indicating that school climate can enhance academic achievement for different populations of students, the results of this study provide limited evidence in support of this claim.

Appendix A

Table 2.2

Primary Definitions of School Culture

Source	**Definition Utilized by the Author**
Deal & Kennedy (1982)	Shared beliefs and values that bring a community together or "the way we do things around here" (p. 4).
Hoy & Miskel (2008)	"A system of shared orientations (assumptions, norms and values) that holds the unit together and gives it a distinctive identity" (p. 177)
McLaughlin & Talbert (2006)	School culture is comprised of three facets: the technical culture, professional norms and organizational policies
Sergiovanni (2000)	The "normative glue that holds a particular school together" (p. 1).

Appendix B

Table 2.3

Primary Definitions of School Climate

Source	**Definition Utilized by the Author**
Ben-Peretz, Schonmann and Kupermintz (1999)	The dimensions making up a school's climate are interpersonal relations, norms of behavior, levels of autonomy, styles of leadership, sense of belonging, job satisfaction and status.
Brookover & Erickson (1975)	The "composite of variables as defined and perceived by the members of this group" (p. 364).
Brown, Anfara & Roney (2004)	Based their research of school climate on the following school climate dimensions: academic emphasis, teacher affiliation, collegial leadership, resource support and institutional integrity.
Freiberg and Stein (1999)	"The heart and soul of the school…the quality of a school that helps each individual feel personal worth, dignity, and importance, while simultaneously helping to create a sense of belonging to something beyond ourselves" (p. 11).
Hansen & Childs (1998)	An environment of support, encouragement, warmth and acceptance where students are valued and have a sense of safety and belongingness and where teachers and students have trusting, respectful and caring relationships.
Hoy & Clover (1986)	The "lived embodiment and experience of how a school is organized, how people relate to one another, and the kinds of relationships that are institutionally supported" (p. 20).
Hoy and Miskel (2008)	"The set of internal characteristics that distinguish one school from another and influence the behavior of each school's members" (p. 198). "School climate is the relatively enduring quality of the school environment that is experienced by participants, affects their behavior, and is based on their collective perceptions of behavior in schools" (p. 198).
National School Climate Center (NSCC)	The quality and character of school life as experienced by students, personnel and families. In this view, school climate sets the tone in a building and provides the context within which teaching and learning takes place.
Stewart (2008)	School climate is made up of three dimensions: school culture (unwritten beliefs, values, attitudes as well as relationships), school organizational structure (class and school size), and school social milieu (background characteristics of students and faculty).
Tagiuri (1968)	School climate includes the ecology (physical and material aspects of the school), the milieu (the social aspects of

	individuals and groups), the social system (patterns of relationships between individuals and groups) and the culture (belief system and values).
U.S. Department of Education's National Center on Safe Supportive Learning Environment's	School climate includes three inter-related aspects of school climate. The first is student engagement and includes relationships, respect for diversity and school participation. The second is safety which includes physical safety and substance use and the third is school environment which includes physical environment, academic environment, wellness and disciplinary environment.

Appendix C

Comprehensive School Climate Inventory (CSCI) Dimensions

Dimensions	Major Indicators
Safety	
1 Rules and Norms	Clearly communicated rules about physical violence; clearly communicated rules about verbal abuse, harassment, and teasing; clear and consistent enforcement and norms for adult intervention.
2 Sense of Physical Security	Sense that students and adults feel safe from physical harm in the school.
3 Sense of Social-Emotional Security	Sense that students feel safe from verbal abuse, teasing, and exclusion.
Teaching and Learning	
4 Support for Learning	Use of supportive teaching practices, such as: encouragement and constructive feedback; varied opportunities to demonstrate knowledge and skills; support for risk-taking and independent thinking; atmosphere conducive to dialog and questioning; academic challenge; and individual attention.
5 Social and Civic Learning	Support for the development of social and civic knowledge, skills, and dispositions including: effective listening, conflict resolution, self-reflection and emotional regulation, empathy, personal responsibility, and ethical decision making.
Interpersonal Relationships	
6 Respect for Diversity	Mutual respect for individual differences (e.g. gender; race, culture, etc.) at all levels of the school—student-student; adult-student; adult-adult and overall norms for tolerance.
7 Social Support—Adults	Pattern of supportive and caring adult relationships for students, including high expectations for students' success, willingness to listen to students and to get to know them as individuals, and personal concern for students' problems.
8 Social Support—Students	Pattern of supportive peer relationships for students, including: friendships for socializing, for problems, for academic help, and for new students.
Institutional Environment	
9 School Connectedness/Engagement	Positive identification with the school and norms for broad participation in school life for students, staff, and families.
10 Physical Surroundings	Cleanliness, order; and appeal of facilities and adequate resources and materials.

Appendix D

Table 2.4

School Climate and Student Achievement Research Summary

Source	**Definition of climate**	**Research Methods**	**Sample**	**Units of Analysis**	**Key Findings**	**Limitations**
Kwong, D., & Davis J.R. (2017)	Individual-level measures: school safety and learning environment School-level measures: institutional school safety enforcement and institutional learning environment	Hierarchical linear model	16,258 students from 1954 schools nationwide	Individual students and school	At the individual-level, student perceptions of the student learning environment and school safety were highly predictive of academic success. At the school-level, institutional facilities were significantly predictive of math and reading scores.	Data is relatively outdated (2002) and does not account for the drastic educational reforms that have occurred since.
Reynolds, K.J., Lee, E., Turner, I., Bromhead, D., & Subasic, E. (2017)	Shared values, approach to rules and academic learning	Structural Equation Modelling	340 7th and 9th grade students	Individual Students	School identification (connectedness, belonging, relatedness) fully mediated the relationship between school climate and academic achievement with a significant indirect effect on numeracy and writing scores but not reading scores.	The sample is small and not representative and its cross-sectional design prohibits an assessment of the direction of association between variables; a unidimensional measure of school climate was used that did not take into account many possible sub-factors that comprise school climate.

					School identification emerges as an important predictor of academic achievement both directly and by creating an indirect effect of school climate on achievement.	
Kraft, M.A., & Marinell, W.H (2016)	Leadership and professional development, high academic expectations, teacher relationships and collaboration, school safety and order	Regression	278 urban middle schools representing 31,000 teacher responses	School	The relationship between school climate and student achievement is stronger in math than in ELA. Safety, expectations and leadership have positive associations with both subjects.	Data is relatively outdated (2008-2012); lack of information about how to actually strengthen key aspects of the learning environment and how to best align those efforts with other school improvement and accountability initiatives.
La Salle, T.P., Zabek, F., & Meyers.J. (2016)	I like school; I feel like I do well in school; my school wants me to do well; my school has clear rules for behavior; I feel safe at school; teachers treat me with respect; good behavior is notices at my school; students in my class behave so that teachers can teach; I get along with other students; students treat each other well; there is an adult at	Hierarchical linear model	197,512 4th and 5th grade students representing 1073 elementary schools	Individual students and school	The majority of variance in elementary student perceptions of school climate is accounted for by student-level variables including gender, race/ethnicity, and grade. Males reported less favorable perceptions of school climate as compared to girls. 4th graders reported higher perceptions of school climate than fifth graders	The sample was limited to elementary school students from one state; the effects of student and school variables on perceptions of school climate were significant, but small and should be interpreted with caution.

	my school who will help me if I need it.					
Shindler, J., Jones, A., Williams, A.W., Taylor, C., & Cardenas, H. (2016)	School appearance and physical plant, faculty relations, student interactions, leadership decision making, discipline environment, learning environment, attitude and culture school-community relations	Correlation	230 urban school districts in five states	School	The quality of school climate decreased as students moved from the elementary to the secondary school-level. Achievement was shown to be highly correlated to overall mean school climate. Achievement was shown to correlate with all eight climate dimensions including a very substantive correlation for classroom discipline practices.	Only student data were used in this study.
Zamora, R & Hernandez.R (2016)	Goal focus, communication adequacy, optimal power equalization, ,resource utilization, cohesiveness, morale, innovativeness, autonomy, adaptation	Spearman Rho	36 Title I elementary, middle and high schools	School	The strongest relationships between reading achievement and the ten OH dimensions existed with morale, resource utilization and goal focus. The strongest relationships between math achievement and the ten OH dimensions	Perceptions of organizational health were collected from teachers only.

					existed with morale, autonomy and goal focus	
Macneil, A.J., Prater, D.L., & Busch, S. (2009)	Organizational Health as characterized by Miles (1971) as, goal focus, communication adequacy, optimal power equalization, resource utilization, cohesiveness, morale, innovativeness, autonomy, adaptation, problem-solving adequacy.	Multivariate analysis of variance (MANOVA)	29 schools in a large suburban school district. 24,684 students. 1727 teachers.	Individual students and School	Schools were categorized as Exemplary, Recognized and Acceptable. Goal focus and adaptation were most effective in discriminating between the cultures of Recognized and Acceptable Schools. Students achieve higher scores on standardized tests in schools with healthy learning environments.	A relatively small sample size is used and there were no low-performing schools in the sample; the sample was composed of elementary, middle, and high schools rather than focusing on one level of school only.
Brand, S., Felner, R. D., Seitsinger, A., Burns, A., & Bolton, N. (2008).	Inventory of School Climate – Teacher (ISC-T): Disruptiveness, Teacher-student interactions, achievement orientation, support for diversity, safety Inventory of School Climate – Student (ISC – S): Teacher support, consistency and clarity of rules and expectations, student commitment and achievement	Factor analysis, confirmatory factor analysis, hierarchical linear modeling	3312 teachers in 187 schools (year 1), 5475 teachers in 301 schools (year 2), 6209 teachers in 312 schools (year 3) and 104,000 students in 187 middle level and junior/senior high schools.	Individual students and school	The strongest predictor of students' performance on standardized tests were teacher reports of students' achievement orientation. Teacher ratings of positive peer relationships, lower levels of disruptiveness and safety problems were also related to students' performance on reading and math tests.	Schools were not randomly selected, but self-selected as part of a self-study and school improvement effort.

	orientation, negative peer interactions, positive peer interactions, disciplinary harshness, ,student input in decision-making, instructional innovation/relevance, support for cultural pluralism, safety problems.		Inner-city, suburban, small town and rural communities were represented.			
Koth, C.W, Bradshaw, C.P., & Leaf, P.J. (2008)	School safety & willingness to learn Two subscales were analyzed for students: order and discipline and academic motivation. Teachers also rated individual student's disruptive or aggressive behaviors.	Multi-level analyses	2468 students in 120 5th grade classrooms from 35 elementary schools. 120 fifth grade teachers.	Individual students, classrooms and school	Individual-level factors (race and gender) accounted for the largest proportion of variance in perceptions of school climate. Male tended to perceive the school less favorably and reported less order and discipline and lower levels of achievement motivation. School-level factors (size and faculty turnover) were significant predictors of perceptions of climate. Class-level factors (characteristics of the	There are several individual-level factors that were not examined in this study that might also influence students; perceptions, such as their academic abilities, social relationships, socioeconomic status, and own their problem behavior.

					teacher, class size, concentration of students with behavior problems) were significant predictors of perceptions of climate.	
Stewart, E. B. (2008).	School culture (unwritten beliefs, values and attitudes), school organizational structure (class and school size) and school social milieu (school cohesion and sense of belonging)	Hierarchical linear modeling	11,999 10th grade students from 715 schools	Individual students and school	Student reported individual-level predictors such as student effort, parent-child discussion and associations with positive peers were significantly associated with student achievement. The one student reported school structural variable that was found to be significantly related to student achievement was school cohesion or sense of belonging.	The student data is relatively outdated (1988-1990).
Ruus, V. R., Veisson, M., Leino, M., Ots, L., Pallas, L., Sarv, E. S., & Veisson, A. (2007).	Social climate is defined by three dimensions (Moos, 1976): -human relations -main directions/goals of personal development -maintenance of stability of the community as a system and system change.	Correlation analysis and regression analysis	3,838 7th, 9th and 12th grade students from 65 schools.	Individual Students	School value system and teachers' attitudes towards students as perceived by the latter help students to develop positive coping strategies and an optimistic outlook about the future which are necessary conditions to bring about academic success and prosocial behavior.	Only student perceptions of school climate were utilized in this study.

	School climate is defined based on Moos' three dimensions of human relations (1976): -valuing certain personality traits -maintenance of status quo -innovation					
Way, Reddy & Rhodes (2007)	Teacher support, peer support, student autonomy in the classroom and clarity and consistency in school rules and regulations	Cross-domain growth modeling which capitalizes on two methodologies: individual growth modeling and covariance structure analysis.	1451 6th through 8th grade students	School	They identified gender and age differences in perceptions of the four climate dimensions studied . Perceptions of all four dimensions of school climate declined over the 3 years of middle school. Girls reported sharper declines in peer support than boys over time.	There was a small number of ethnic minority students in the sample which prevented and analysis that compared across ethnic groups; the sample which had a relatively high rate of both parental college education and free lunch eligibility was not necessarily representative of the broader US population.
Sherblom, S.A., Marshall, J.C., & Sherblom, J.C. (2006)	Perceptions of social dynamics regarding inclusion, concern, respect, collaboration and belonging.	Correlation and regression	3rd and 4th grade students from 40 elementary schools.	School	Students' perceptions of the classroom community, their sense of wellbeing, and their concern for others were strongly related to math and reading proficiency.	Only data for 3rd and 4th grade students was used.

					Teacher and staff feelings of belonging, leadership support and collaboration all were strongly related to 3rd and 4th grade proficiency in math and reading. They also found that positive classroom community, affective liking of school, trust/respect for teachers, concern for others, school leadership, parent-teacher relations and school expectations were strongly correlated with reading scores only.	
Buckley, M.A., Storino, M, & Sebastiani, A.M. (2003)	Well kept school, supportive school, unsafe school	Correlation analysis Multiple Regression Analysis	369 7th grade students from a semi-rural school district	Individual students	For students overall, perception of school climate was a significant predictor of GPA with perceptions of the school as supportive functioning as the key contributing element of school climate. Boys may be uniquely at-risk when considering perceptions of school climate and academic	This study relies on GPA alone as the only one predictor of academic achievement; this study relies on self-report for perceptions of school climate; causality is not determined in this study - high achieving students may perceive school climate as more positive.

					success. Compared with girls, boys' perceptions of school climate were more negative. They were less likely to find the campus to be well-maintained or to find school staff supportive. They were also more likely to report feeling unsafe at school. Boys were also more likely to report a wide range of victimization experiences than girls and their GPA's tended to be lower. School climate predicted twice as much variance in GPA then it did for girls. This suggests that school climate is especially important to the academic achievement of male middle school students.	
Yates, S. (2003)	Cohesiveness, friction, satisfaction, competitiveness and difficulty	Structural equation modelling	2342 students from grades 3-12	School	Gender is directly and significantly related to cohesiveness, friction and satisfaction, with girls more cohesive and more satisfied with school life than boys but with boys	There were far fewer girls in the sample than boys; there was no one curriculum area studied by all students in the sample.

					perceiving a higher level of friction than the girls.	
Goddard, R. D., Sweetland, S. R., & Hoy, W. K. (2000)	A climate in which teachers believe that their student have the capabilities to achieve, students work hard to succeed and are respected for their academic accomplishments, and the learning atmosphere is orderly and serious.	Hierarchical linear modeling	442 teachers across 45 urban elementary schools and 2429 students from the same elementary schools.	Individual students and school	Academic emphasis had a positive impact on student achievement in math and reading.	All schools were from the same district therefore limiting the possibility of comparing schools from different districts.
Ma, X., & Klinger D.A. (2000)	Disciplinary climate, academic press, parental involvement	Hierarchical linear modeling	6883 6th grade students from 148 schools	Individual students and school	The relationship between disciplinary climate and student achievement was significant for math, science and writing but not reading.	The data used are relatively outdated (1995-1996).
Sweetland, S. R., & Hoy, W. K. (2000)	Collegial leadership, teacher professionalism, academic press, environmental press	Multiple regression	86 middle schools Urban, suburban and rural schools were represented in the sample.	School	The strongest climate predictors of teacher empowerment are collegial leadership and academic press. Teacher empowerment is related to higher levels of organizational effectiveness and student performance.	Only two organizational properties that contribute to student achievement were studied and there are likely others; teacher empowerment was viewed as a global measure instead of being studied in terms of different empowerment domains.
Esposito, C. (1999)	Perceptions of the physical and psychological school environment including	Correlational analysis	152 low-income minority families	Individual students and teachers	The school climate dimension with the strongest relationship to student academic and	Climate data comes from perceptions and not an objective measure of

	relationships among and between administration, teachers, parents, students and the community at large, instructional and extracurricular management, the condition of the school building and grounds, the encouragement of the development of academic and social values among students. (Kelley et al. 1986)	Hierarchical linear regression analyses	living in chronic poverty - followed from Kindergarten through second grade		social development was the influence of the teacher/student relationship. The teacher/student relationship especially showed an important impact on children's school adjustment which in turn showed a relationship to increased math and reading achievement scores as well as social skill development such as cooperation and assertiveness.	actual conditions in the school.
Shann, M. H. (1999)	Teacher commitment to students, teacher relationships with others, cooperation among students.	Anova	1503 students 92 teachers from four urban middle schools	Individual Students and School	The highest achieving school combined an emphasis on academics with a culture of caring that was reflected in higher rates of prosocial behaviors and lower rates of antisocial behaviors among students. Positive perceptions of teacher caring and commitment corresponded to higher rates of academic achievement.	Schools in the study enrolled uneven distributions of students across racial/ethnic groups and genders; one of the schools was in turmoil at the time of data collection as it had seen two principals in less than 6 months before a third principal began a transformation of the troubled school.

					Grade level was significant in the analysis of every one of the six factor scores. Gender was related to differences climate perception.	
Gaziel, H. H. (1997)	Academic emphasis, continuous school improvement, orderliness, teamwork, adaptation to customers; demands, student participation.	Anova Stepwise regression	20 secondary schools representing primarily disadvantage d students	School	Academic emphasis was the strongest predictor of academic achievement. Schools that placed a greater emphasis on academic achievement were able to along the way attain an orderly atmosphere.	This study did not study the extent to which school climate dimensions as exemplified by specific actions and behaviors were applied in daily staff and student behaviors to allow for a comparison of the cultural profiles of different types of schools.
Griffith, J. (1997)	For parents: parent is made to feel welcome, office staff are helpful and courteous to the parent, teachers and principal are interested and cooperative when discussing the parent's child. For students: school facilities, helpfulness of school staff, school safety, student-teacher relationships, academic	ANOVA	A sample of parents and students were drawn from 122 suburban elementary schools. 33,244 parents completed the survey and 26,904 students completed the survey.	School and classroom	Schools that provide an orderly social environment lead to higher quality teaching and learning and higher levels of student satisfaction and academic performance.	School climate data relied on parent and student perceptions of the school environment as opposed to an objective measure.

	instruction, student diversity					
Hoy, W.K., & Hannum, J.W. (1997)	Organizational health as characterized by three levels of control: technical level (academic emphasis and teacher affiliation), managerial level (collegial leadership, resource support and principal influence) and institutional level (institutional integrity) (Parsons, Bales & Shils, 1953)	Multiple regression	86 Middle Schools Urban, suburban and rural schools were represented in the sample.	School	Teacher affiliation, resource support and academic emphasis made significant contributions to academic achievement.	This study does not address important issues such as whether school health is actually a prerequisite to school improvement and what the impact of principal, teacher, and student commitment are related to school health; a standard measure of achievement over the large number of school districts was not used; only one measure of school effectiveness was utilized – student achievement; other indicator dos school effectiveness such as problem-solving skills and social-emotional development were not considered.
Kuperminc, Leadbeater, Emmons & Blatt (1997)	Quality and frequency of students' perceived interactions with adults and other students.	Multiple regression	466 6th and 7th grade students attending a large urban middle school.	Individual students	They found gender differences in early adolescents' responsiveness to their environments at school. For girls, school climate perceptions were	Data was collected from only one school for one year only; the study uses students' self-reports to evaluate their subjective perceptions of school climate.

					independently associated only with self-reported externalizing problems.	
Battistich, Solomon, Kim, Watson, & Schaps (1995)	Caring and supportive interpersonal relationships in the classroom, caring and supportive relationships throughout the school, student autonomy and influence on classroom norm setting and decision making.	Hierarchical linear modeling	4515 3rd through 6th grade students from 24 schools representing urban and suburban communities.	Individual students and school	Grade, ethnicity and gender effects existed on students' attitudes, motives, beliefs and behavior.	Small number of schools investigated; use of only a single school year of data.
Brookover, W.B., Schweitzer, J.H., Schneider, J.M., Beady, C.H., Flood, P.K., & Wisenbaker, J.M. (1978)	Students: Sense of academic futility, future evaluations and expectations, perceived present evaluations and expectations, perception of teacher push and teacher norms, academic norms Teachers: Ability, evaluations, expectations and quality of education/college, present evaluations and expectations for high school completion, teacher-student commitment to improve, perception of	Multiple regression analysis	129 elementary schools containing 4th and 5th grade students	School	Somewhat different set of school climate dimensions contributed more highly to mean school achievement in majority black schools than in majority white schools.	This research does not demonstrate how climate characteristics develop in schools or what the processes are by which climate is associated with higher achievement.

	principal's expectations, academic futility. Principal: parent concern and expectations for quality education, efforts to improve, principal and parent evaluation of present school quality, present evaluations and expectations of students.					

Appendix E

Summary of Variables Used in Analyses

School-Level Analysis

In the first stage of the study, the relationship between the average scores for school climate dimensions as defined by NSCC and the percentage of 4th and 5th grade students who achieved proficiency or higher on state assessments in reading and mathematics was examined. The relationships between achievement and the four major dimensions were examined first, followed by the relationship between achievement and the ten subdimensions. Whether these relationships differed by gender, grade, and subject area was also examined. In this stage of the analysis, the first three research questions were addressed using school-level data, descriptive statistics, and bivariate regression. The sample for this stage of the analysis included 1618 4th and 5th grader students from 14 different elementary schools. The sample included 822 4th graders (50.20%) and 796 5th graders (49.20%). The sample included 792 female students (48.90%) and 826 male students (51.10%). Descriptive statistics for both the independent and dependent variables are summarized here.

Dependent Variables

The dependent variables in this stage of the analysis were the percentage of students scoring proficient or advanced on state assessments in reading and math.

Reading achievement: Percentage of students scoring proficient or advanced on state assessment in reading. This measure has a mean (M) of 77.40, a standard deviation (SD) of 12.80 and a range of 44.00 to 97.35.

Mathematics achievement: Percentage of students scoring proficient or advanced on state assessment in mathematic. This measure has a mean (M) of 83.53, a standard deviation (SD) of 15.41 and a range of 35.00 to 97.30.

Independent Variables

The independent variables in the stage of the analysis were the average scores on each of the school climate dimensions. This chart shows the mean, standard deviation, minimum score and maximum score for each of the four major school climate dimensions for all students in the analysis.

		All Students
Safety	Mean	3.68
	Standard deviation	0.26
	Minimum score	3.08
	Maximum score	4.04
Teaching & Learning	Mean	3.99
	Standard deviation	0.11
	Minimum score	3.80
	Maximum score	4.23
Interpersonal Relationships	Mean	4.03
	Standard deviation	0.20
	Minimum score	3.52
	Maximum score	4.30
Institutional Environment	Mean	3.89
	Standard deviation	0.14
	Minimum score	3.61
	Maximum score	4.11

This chart shows the mean, standard deviation, minimum score and maximum score for each of the ten school climate subdimensions across gender, grade, and subject area.

		All Students
Rules and norms	Mean	4.31
	Standard deviation	0.13
	Minimum score	4.01
	Maximum score	4.49
Sense of physical security	Mean	3.46
	Standard deviation	0.36
	Minimum score	2.60
	Maximum score	3.98
Sense of social-emotional security	Mean	3.27
	Standard deviation	0.30
	Minimum score	2.62
	Maximum score	3.71
Support for learning	Mean	3.99
	Standard deviation	0.09
	Minimum score	3.82
	Maximum score	4.18
Social and civic learning	Mean	3.98
	Standard deviation	0.14
	Minimum score	3.71
	Maximum score	4.28
Respect for diversity	Mean	3.96
	Standard deviation	0.24
	Minimum score	3.23
	Maximum score	4.21
Social support – adults	Mean	4.16
	Standard deviation	0.16
	Minimum score	3.81
	Maximum score	4.47
Social support – students	Mean	3.98
	Standard deviation	0.21
	Minimum score	3.51
	Maximum score	4.29
School connectedness and engagement	Mean	4.03
	Standard deviation	0.13
	Minimum score	3.79
	Maximum score	4.23
Physical surroundings	Mean	3.74
	Standard deviation	0.18
	Minimum score	3.38
	Maximum score	4.00

Student-Level Analysis

In the second stage of the study, the relationship between individual perceptions of school climate dimensions as defined by NSCC and individual achievement in mathematics and reading was examined. For this analysis, the focus was on the school climate and achievement data associated with the elementary school located in Washington DC. The relationships between achievement and the four major dimensions were examined first, followed by the relationships between achievement and the ten subdimensions. In this stage of the analysis the last four research questions were addressed using student-level data, descriptive statistics, and multiple regression.

Two samples were used in this stage of the analysis. One sample (n=72) examined the relationships between gender, grade, and prior achievement across reading and mathematics scores. This sample contained 32 female students (44.4%) and 40 male students (55.6%). Of these students, 35 were fourth grade students (48.6%) and 37 were fifth grader students (51.4%). The second sample (n=120) examined the relationships between gender and grade across reading and mathematics scores. This sample contained 60 female students (50%) and 60 male students (50%). Of these students, 63 were fourth grade students (52.5%) and 57 were fifth grade students (47.5%).

Dependent Variables

The dependent variables for both samples in this stage of the analysis were the reading and mathematics achievement scores at the student level. The chart below shows the mean, standard deviation and minimum and maximum scores for reading and mathematics scores for both samples used in this stage of the analysis.

	Reading		Math	
	72 student sample	120 student sample	72 student sample	120 student sample
Mean	505.91	501.05	509.68	504.45
Standard Deviation	52.54	52.75	51.10	51.20
Minimum	436.00	420.00	440.00	434.00
Maximum	575.00	582.00	581.00	585.00

Independent Variables

The independent variables in the stage of the analysis were the average scores on each of the school climate dimensions as well as gender, grade and prior achievement. Student's gender was dummy coded as, 0 = female, and 1= male; student grade was dummy coded as, 0=4th grader students and 1=5th grade students; prior achievement was dummy coded as 0=student scored basic or below basic on state assessment and 1=student scored proficient or advanced on state assessment.

This chart shows the mean, standard deviation, minimum score and maximum score for each of the four major school climate dimensions for both samples in this stage of the analysis.

		72 student sample	120 student sample
Safety	Mean	3.51	3.05
	Standard deviation	0.49	0.56
	Minimum score	1.71	1.56
	Maximum score	4.62	4.55
Teaching & Learning	Mean	3.69	3.66
	Standard deviation	0.65	0.67
	Minimum score	2.13	2.00
	Maximum score	5.00	5.00
Interpersonal Relationships	Mean	3.48	3.49
	Standard deviation	0.66	0.28
	Minimum score	1.77	2.60
	Maximum score	4.86	4.27
Institutional Environment	Mean	3.58	3.48
	Standard deviation	0.65	0.69
	Minimum score	1.91	1.50
	Maximum score	4.93	5.00

This chart shows the mean, standard deviation, minimum score and maximum score for each of the ten school climate subdimensions across gender, grade, and subject area.

		72 student sample	120 student sample
Rules and norms	Mean	3.82	3.76
	Standard deviation	0.88	0.87
	Minimum score	1.00	1.00
	Maximum score	5.00	5.00
Sense of physical security	Mean	3.25	2.80
	Standard deviation	0.56	0.78
	Minimum score	1.80	1.00
	Maximum score	4.60	5.00
Sense of social-emotional security	Mean	3.45	2.59
	Standard deviation	0.49	0.62
	Minimum score	2.22	1.22
	Maximum score	4.55	4.11
Support for learning	Mean	3.69	3.67
	Standard deviation	0.68	0.71
	Minimum score	1.60	1.60
	Maximum score	5.00	5.00
Social and civic learning	Mean	3.68	3.66
	Standard deviation	0.73	0.73
	Minimum score	1.88	1.88
	Maximum score	5.00	5.00
Respect for diversity	Mean	3.21	3.21
	Standard deviation	0.99	0.94
	Minimum score	1.00	1.00
	Maximum score	5.00	5.00
Social support – adults	Mean	3.75	3.79
	Standard deviation	0.82	0.87
	Minimum score	1.12	1.14
	Maximum score	5.00	5.00
Social support – students	Mean	3.47	3.48
	Standard deviation	0.66	0.72
	Minimum score	1.80	1.80
	Maximum score	5.00	5.00
School connectedness and engagement	Mean	3.64	3.61
	Standard deviation	0.74	0.71
	Minimum score	1.50	1.50
	Maximum score	5.00	5.00
Physical surroundings	Mean	3.51	3.36
	Standard deviation	0.73	0.83
	Minimum score	2.00	1.00
	Maximum score	5.00	5.00

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